US009474386B2

(12) **United States Patent**
Scarleski

(10) **Patent No.: US 9,474,386 B2**
(45) **Date of Patent: Oct. 25, 2016**

(54) **ADJUSTABLE MATTRESS RETAINER BARS**

(71) Applicant: **Levitation Sciences LLC**, Chicago, IL (US)

(72) Inventor: **William John Scarleski**, Chicago, IL (US)

(73) Assignee: **LEVITATION SCIENCES LLC**, Chicago, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/628,765**

(22) Filed: **Feb. 23, 2015**

(65) **Prior Publication Data**

US 2015/0366362 A1 Dec. 24, 2015

Related U.S. Application Data

(63) Continuation-in-part of application No. 14/304,385, filed on Jun. 13, 2014.

(51) **Int. Cl.**
A47C 21/00 (2006.01)
A47C 21/02 (2006.01)

(52) **U.S. Cl.**
CPC ***A47C 21/026*** (2013.01)

(58) **Field of Classification Search**
CPC A47C 21/00
USPC 5/658, 659, 411, 193, 503.1
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,669,732 A	2/1954	Moon		
2,817,854 A	12/1957	Pratt		
3,002,200 A	10/1961	Murcott		
3,032,781 A	5/1962	Constanti		
4,439,880 A	4/1984	Koncelik et al.		
6,240,583 B1 *	6/2001	Brooke	A61G 7/012	5/430
7,805,789 B1 *	10/2010	Dean	A47C 21/08	5/646

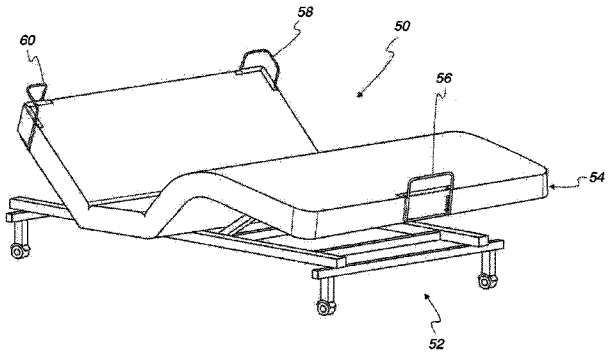
* cited by examiner

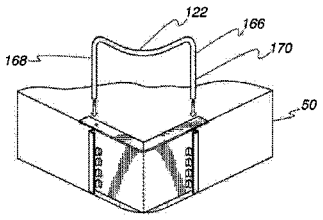
Primary Examiner — Fredrick Conley
(74) *Attorney, Agent, or Firm* — John S. Paniaguas; Clark Hill PLC

(57) **ABSTRACT**

A. mattress bar retainer system is disclosed for use with adjustable mattress platforms. The mattress retainer bar system is used to prevent movement of the mattress during positioning of the adjustable mattress platform assembly. In a rotate mode of operation, one or more mattress retainer bars at the head/foot end or corners of the bed are removably attachable and re-installable to the mattress platform. In an alternate embodiment, the mattress retainer bars are configured to be positioned to enable the mattress to be rotated relative to the adjustable mattress platform in a rotate mode of operation. After the mattress is rotated to the desired position, the mattress retainer bars are restored to their normal position in a normal mode of operation. In an alternative embodiment, the retainer bars are motorized to enable the retainer bars to be positioned at the touch of a button on a control pad. In an alternate embodiment of the invention, a retainer bar is disclosed for use with fitted sheets. In yet another embodiment, the retainer bar is secured to the mattress platform and received in a pocket in an underside of a mattress encasement.

20 Claims, 21 Drawing Sheets





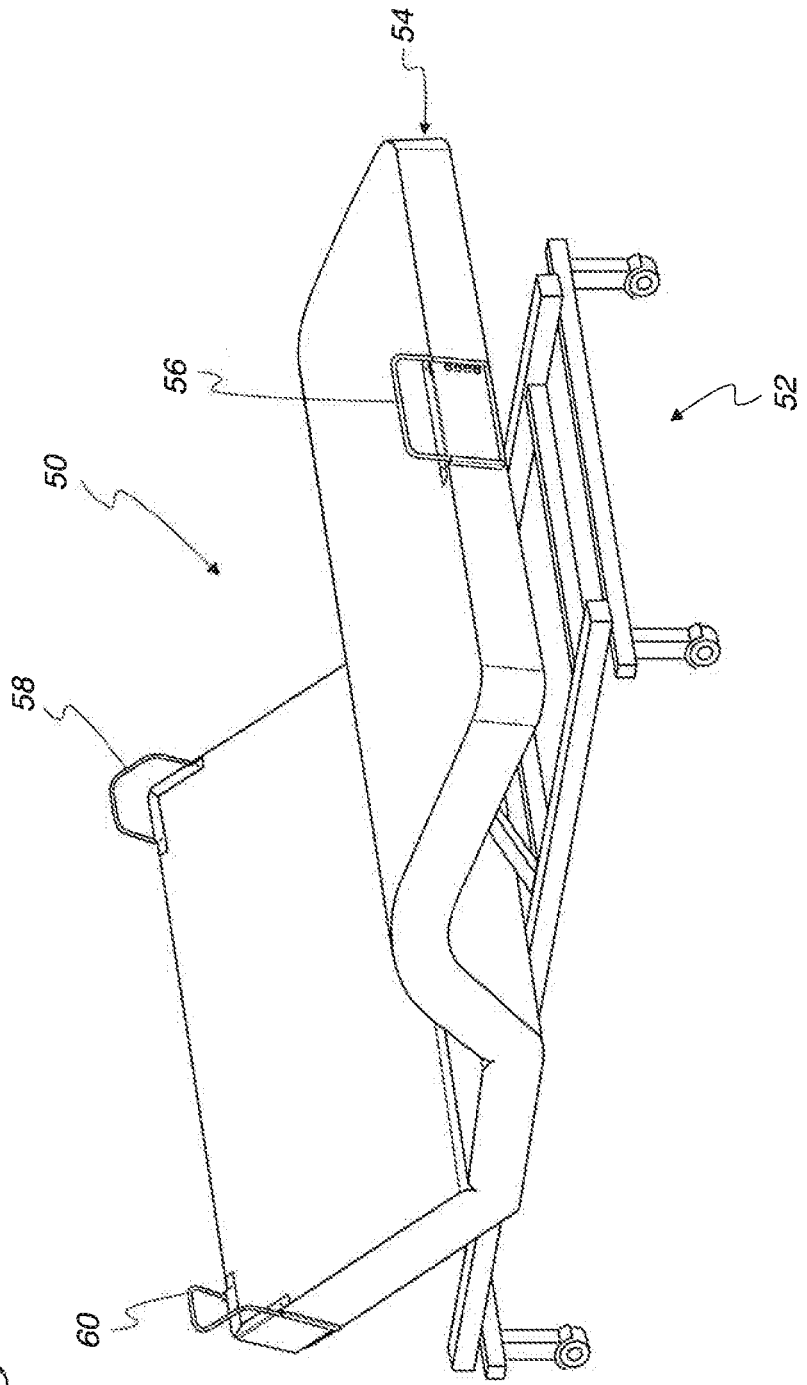


Fig. 1

Fig. 2

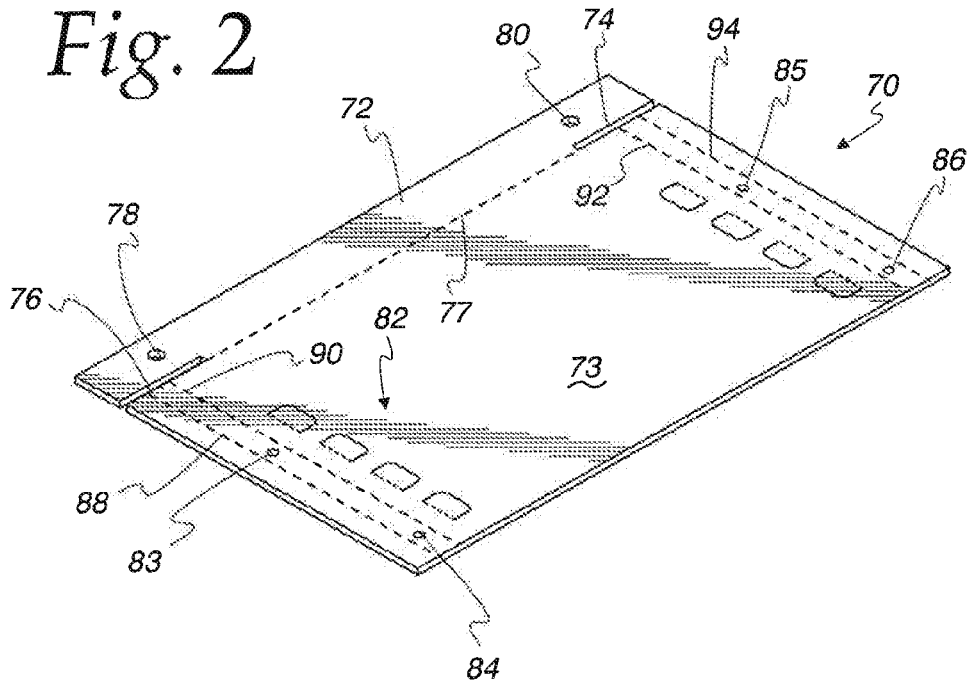

80
74
94
85
70
72
86
92
78
76
77
82
90
73
88
83
84

Fig. 3

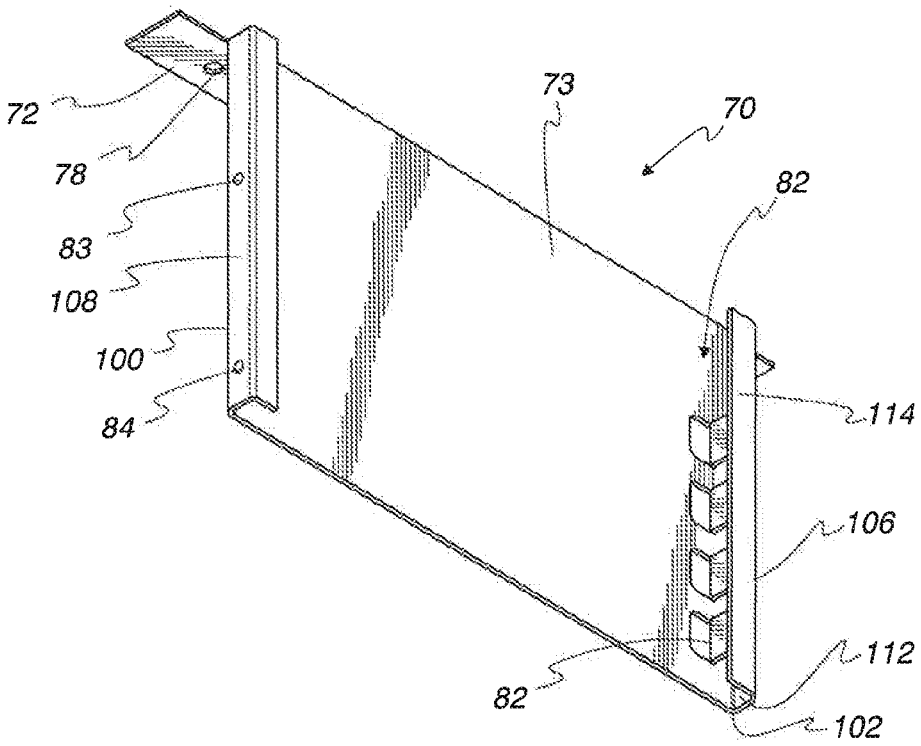

72
73
70
78
82
83
108
100
84
114
106
112
82
102

Fig. 4

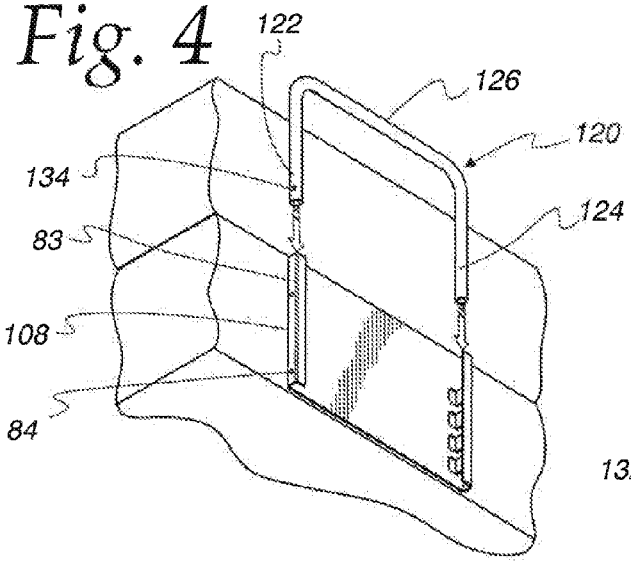


Fig. 5

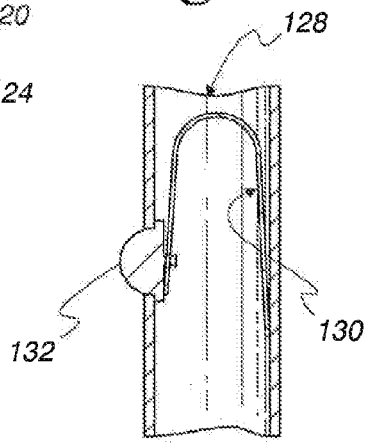


Fig. 6

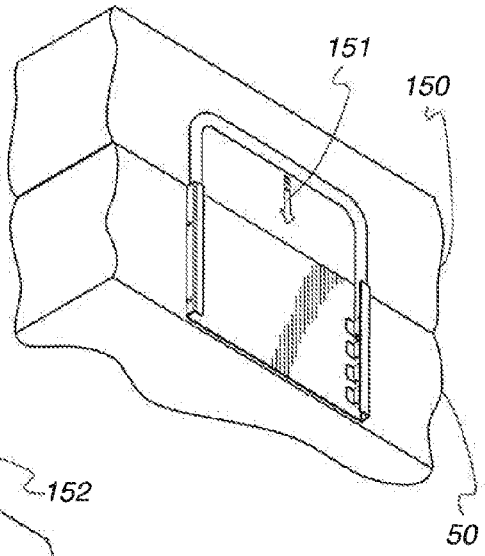


Fig. 7

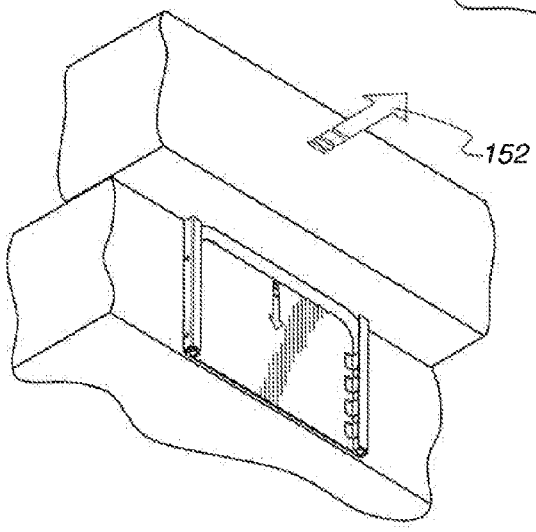


Fig. 8

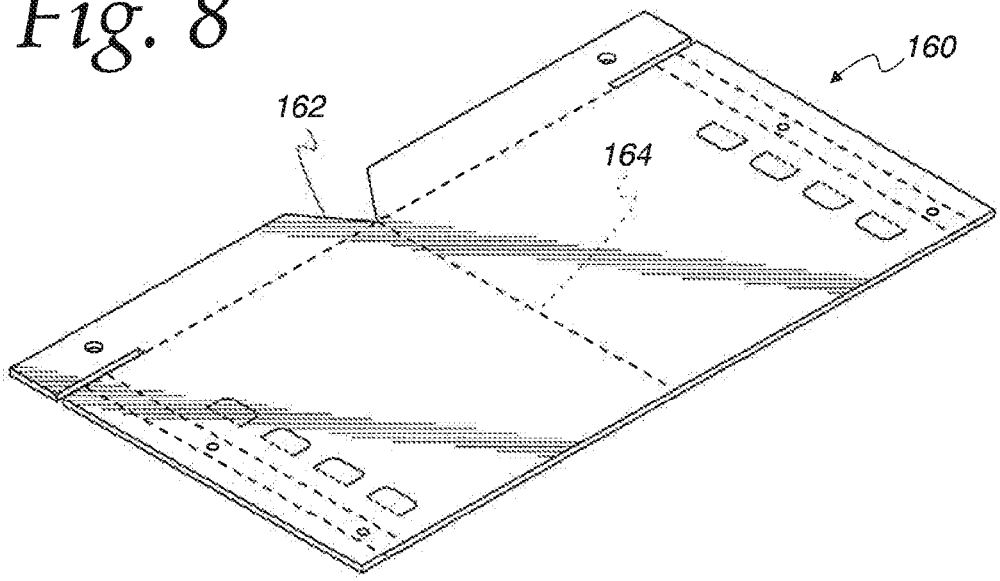


Fig. 9

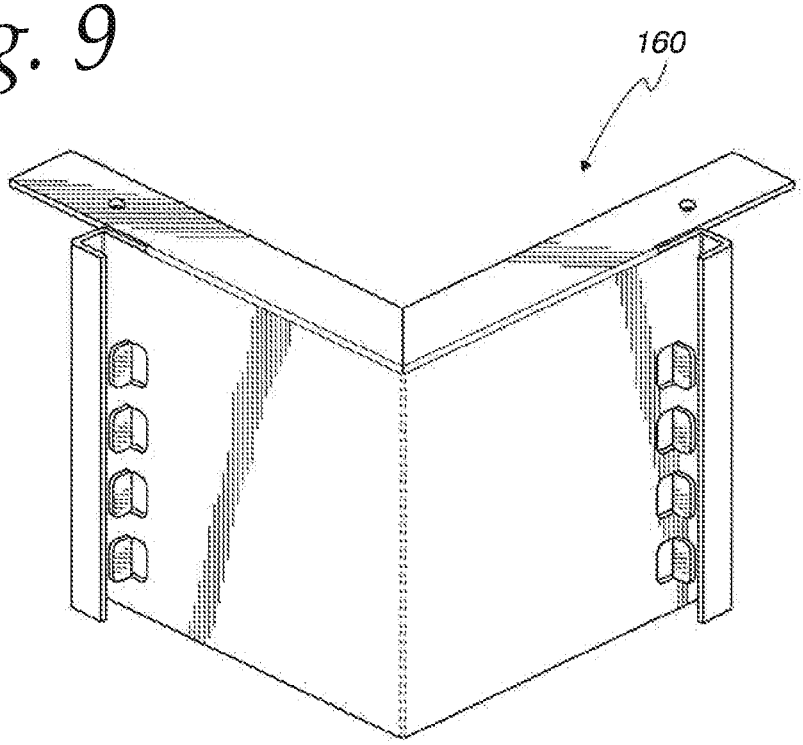


Fig. 10

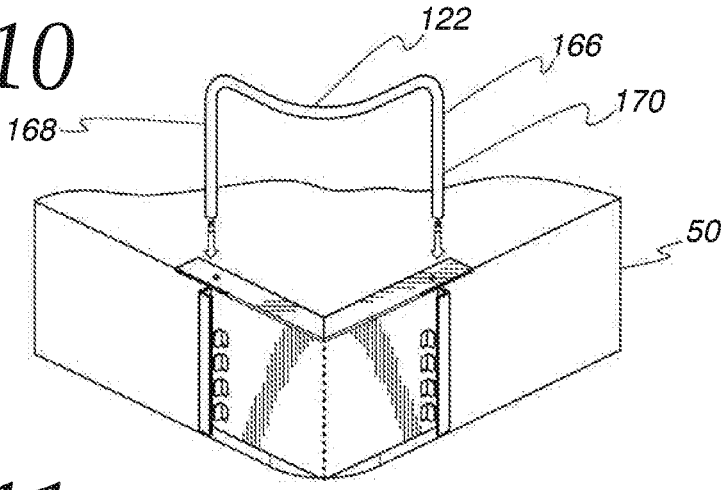


Fig. 11

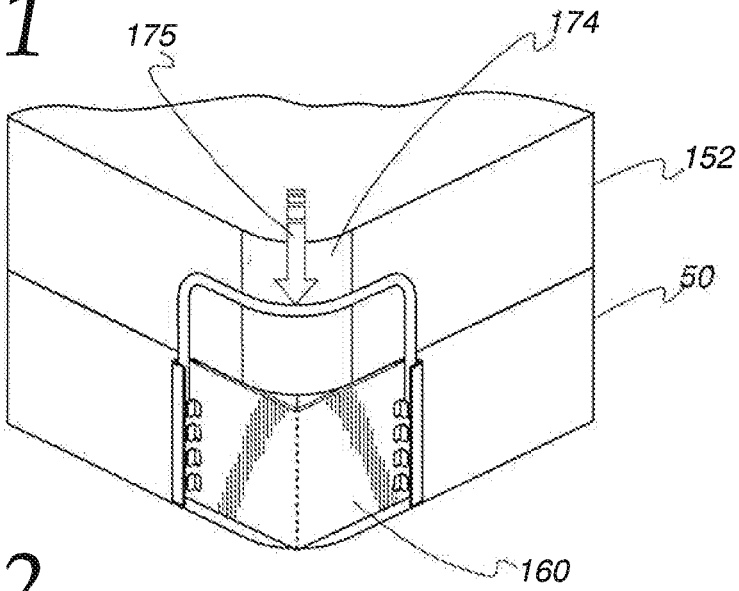


Fig. 12

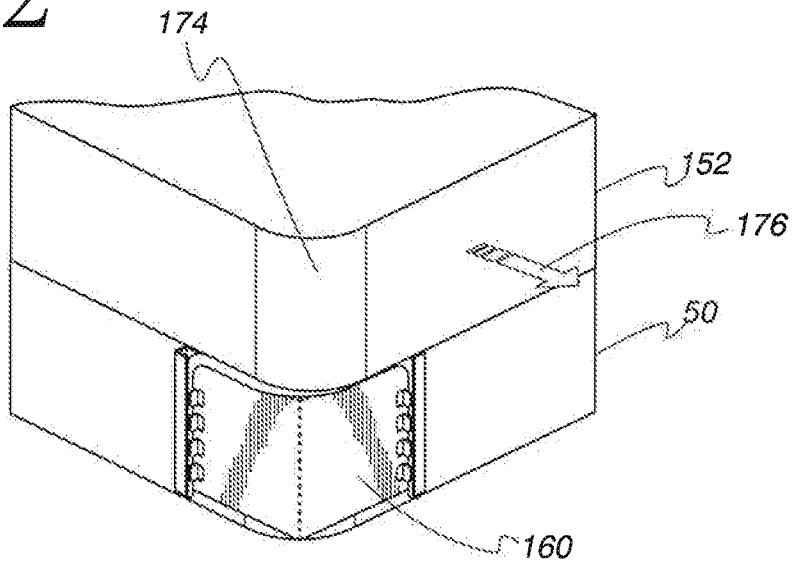


Fig. 13

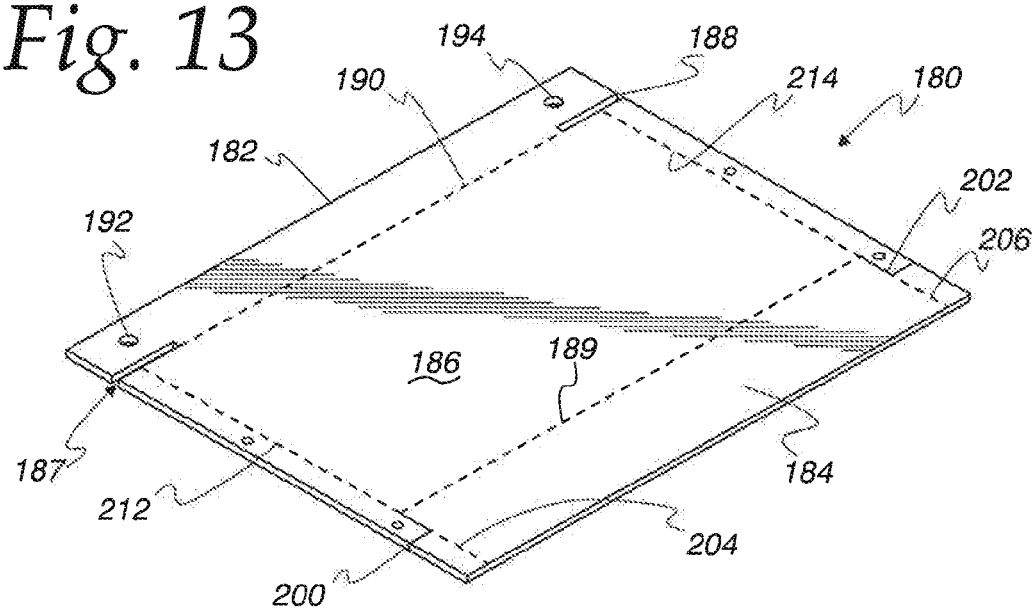

194
188
190
214
180
182
202
192
206
186
189
187
184
212
204
200

Fig. 14

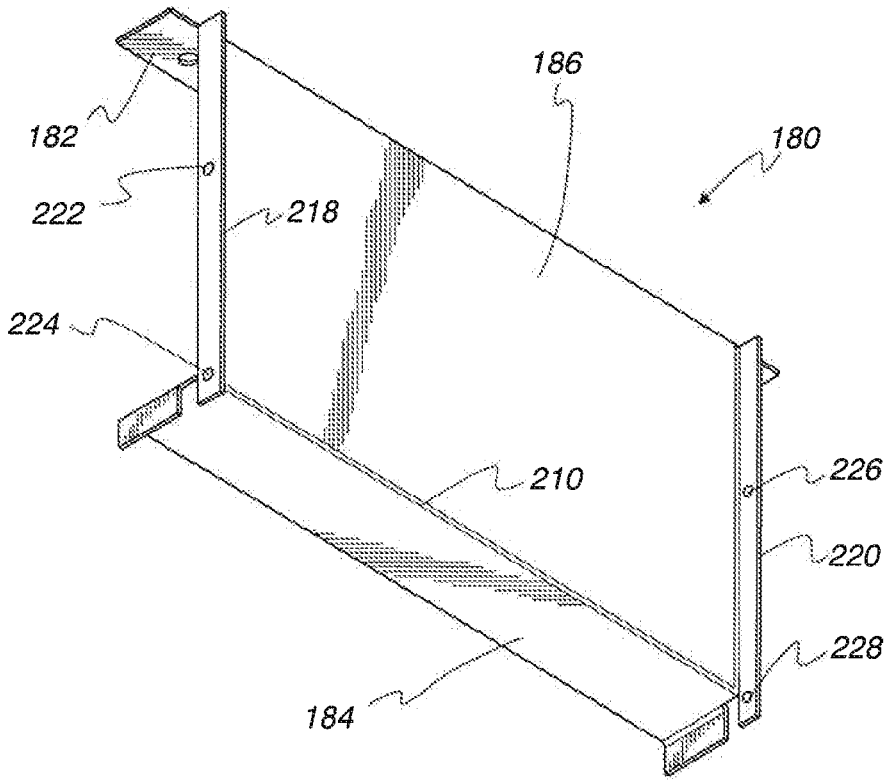

186
182
180
222
218
224
210
226
220
228
184

Fig. 15

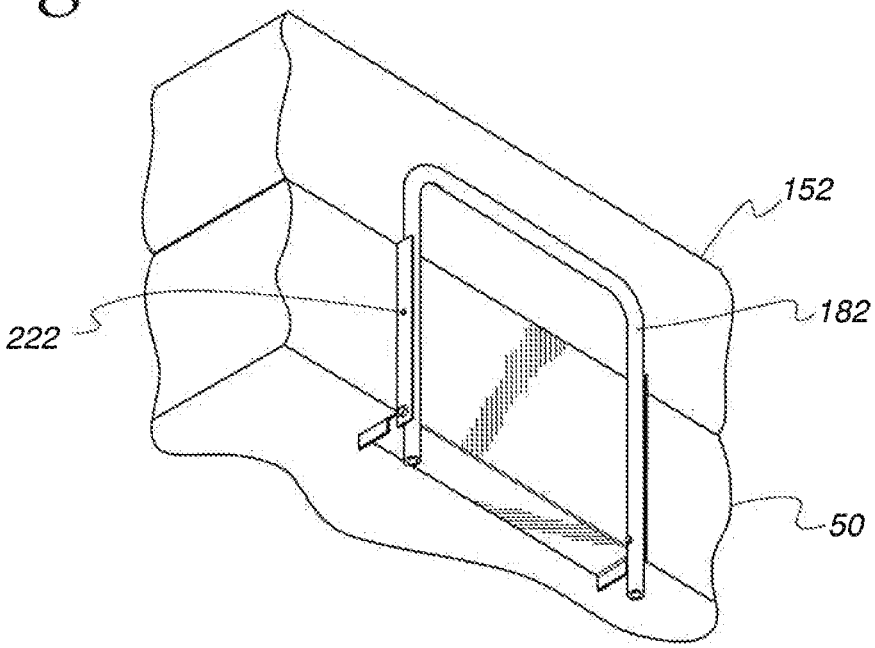


Fig. 16

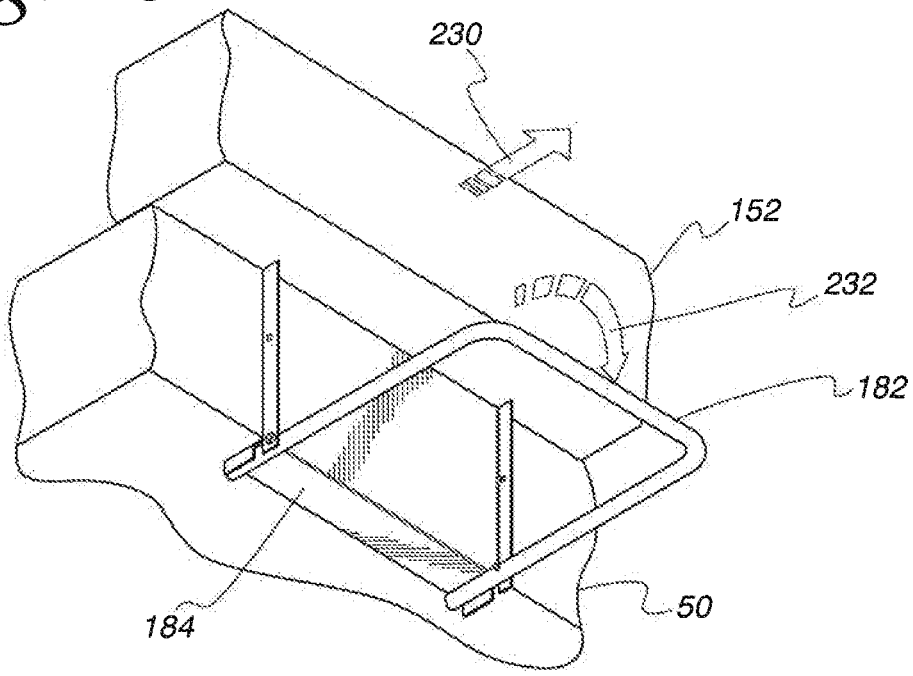


Fig. 17

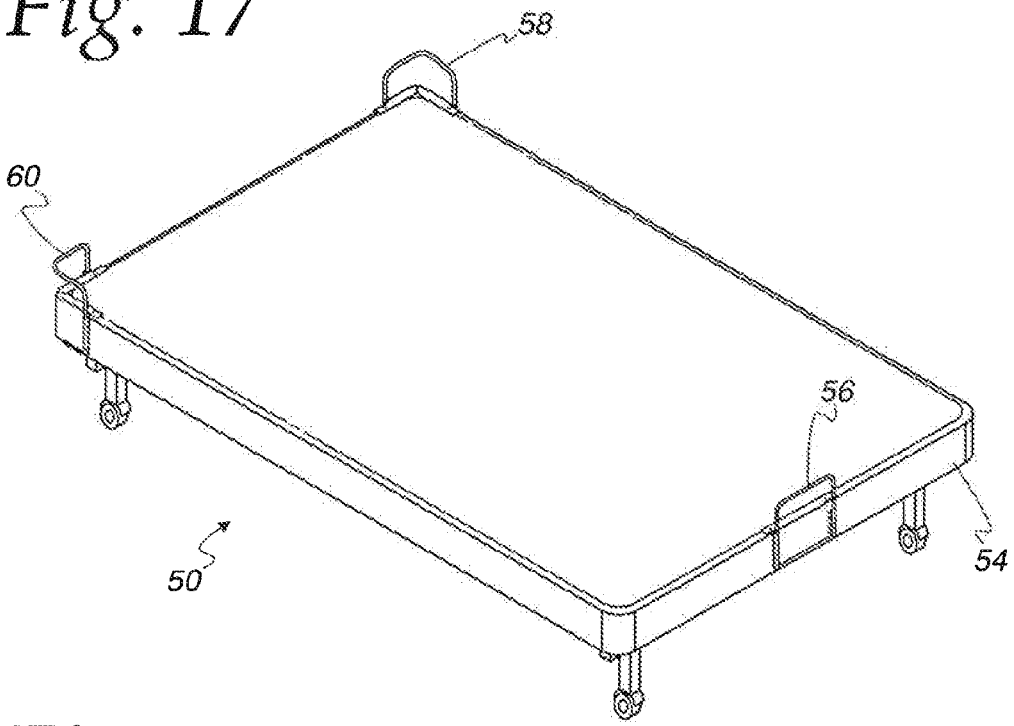


Fig. 18

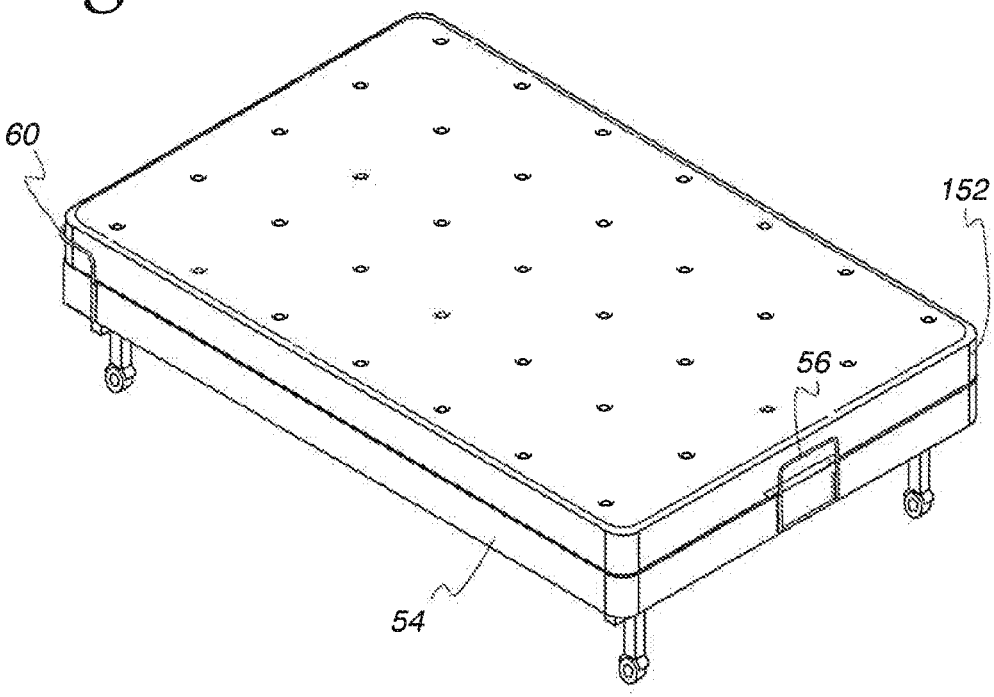


Fig. 19

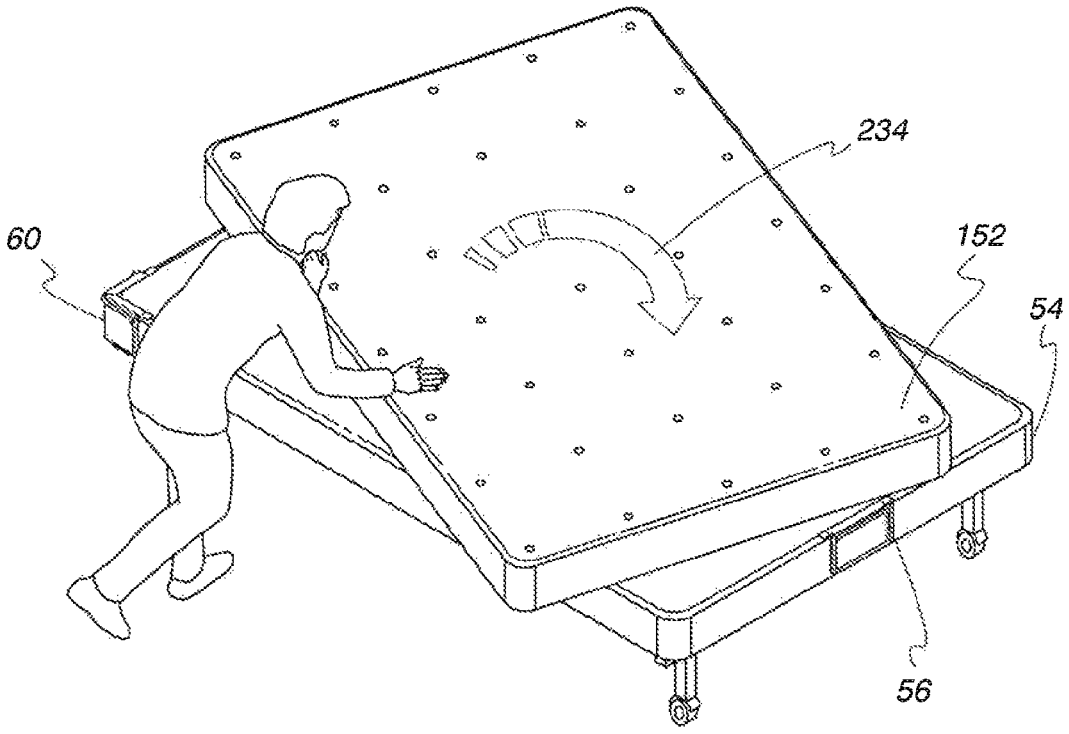


Fig. 20

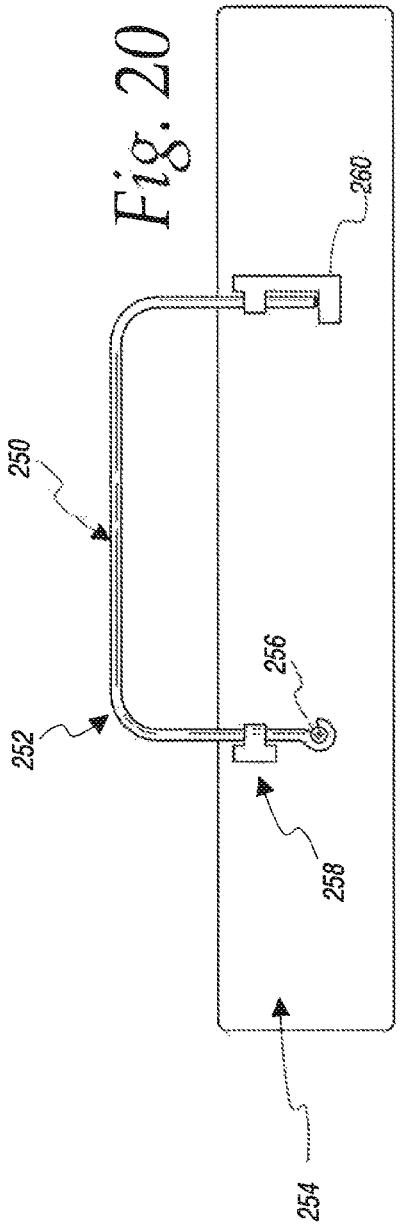
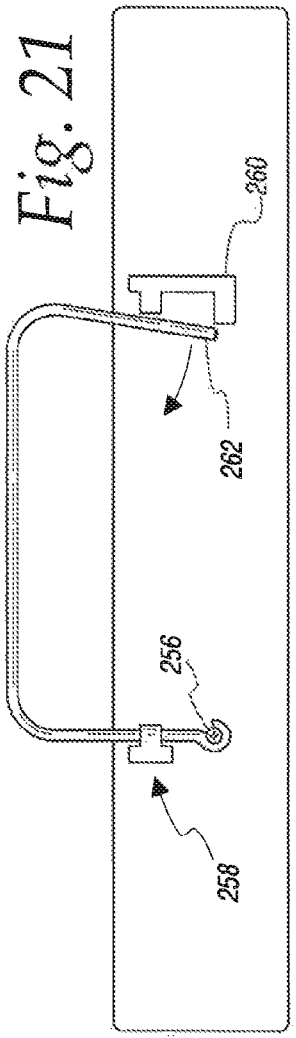


Fig. 21



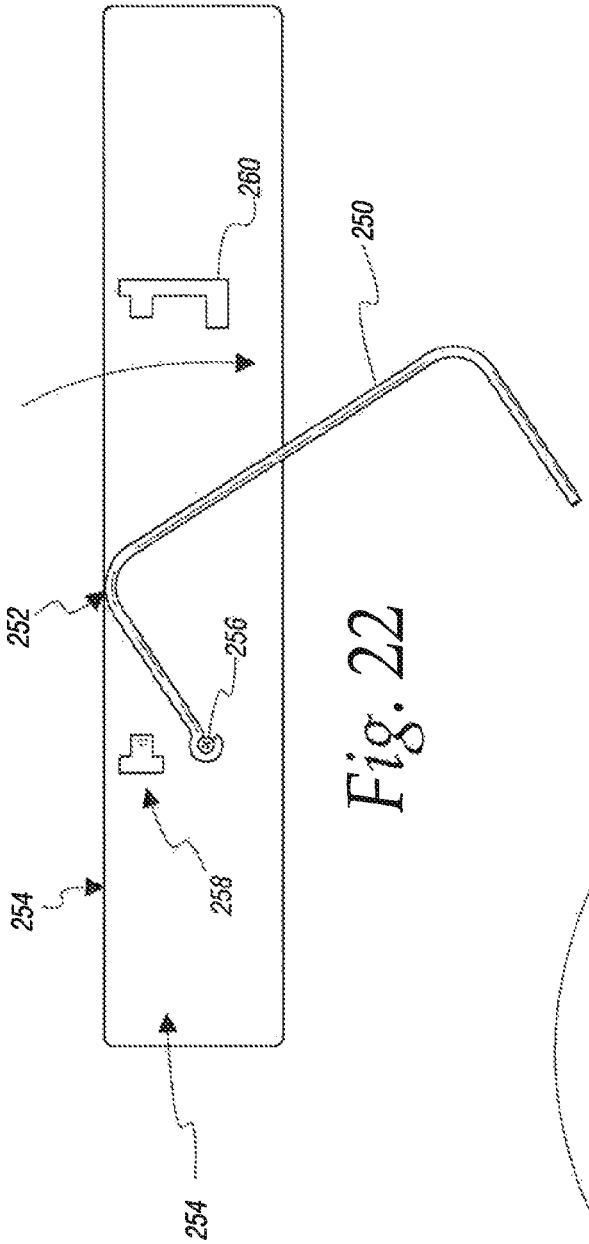


Fig. 22

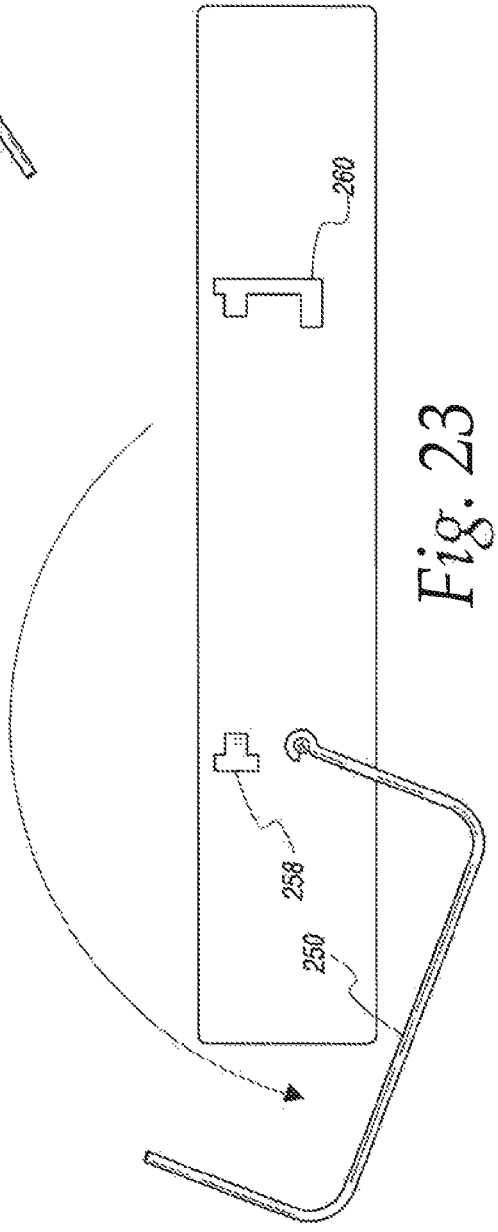


Fig. 23

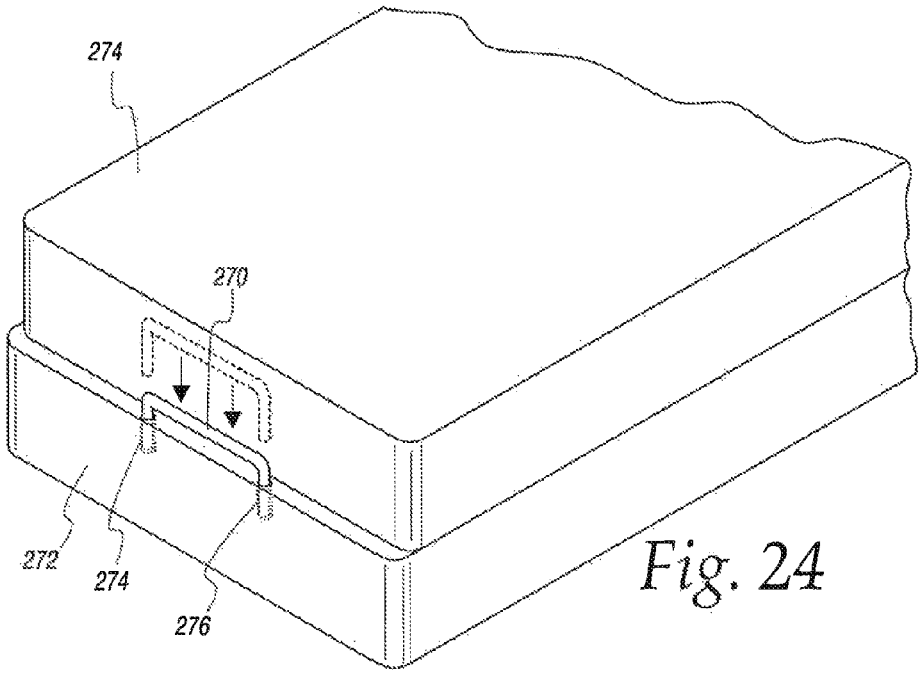


Fig. 24

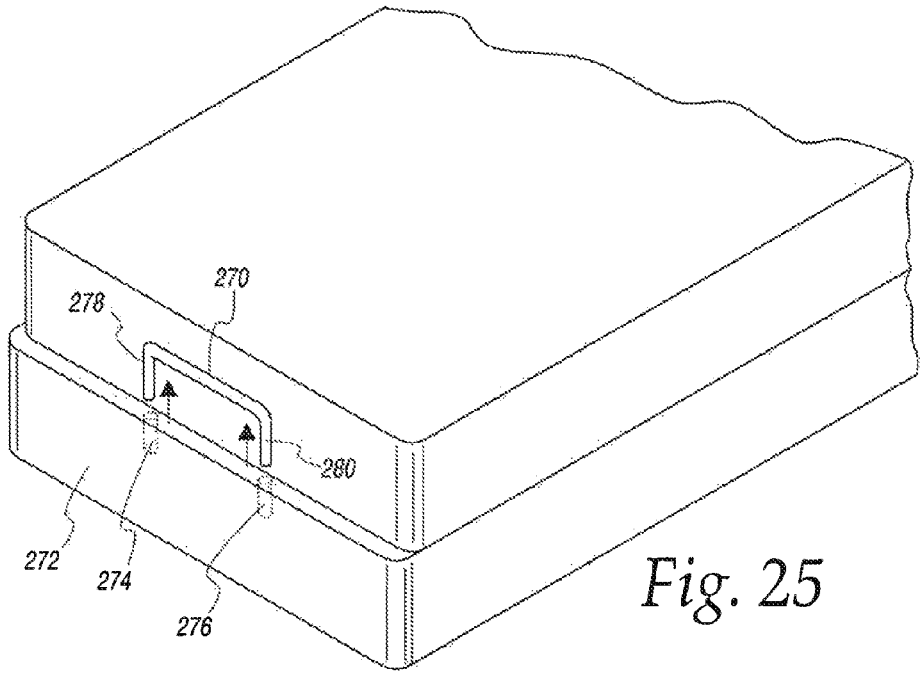


Fig. 25

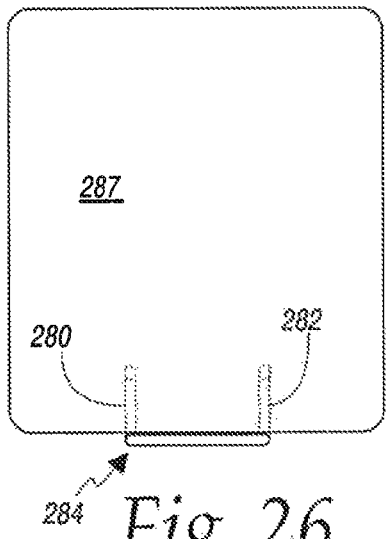


Fig. 26

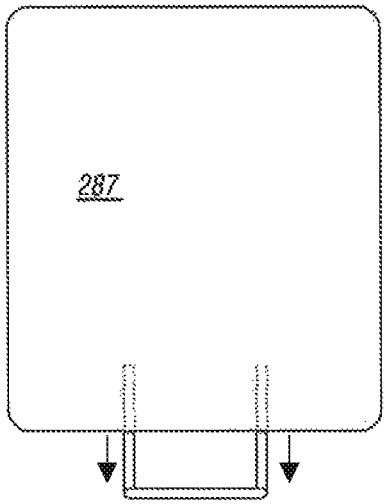


Fig. 27

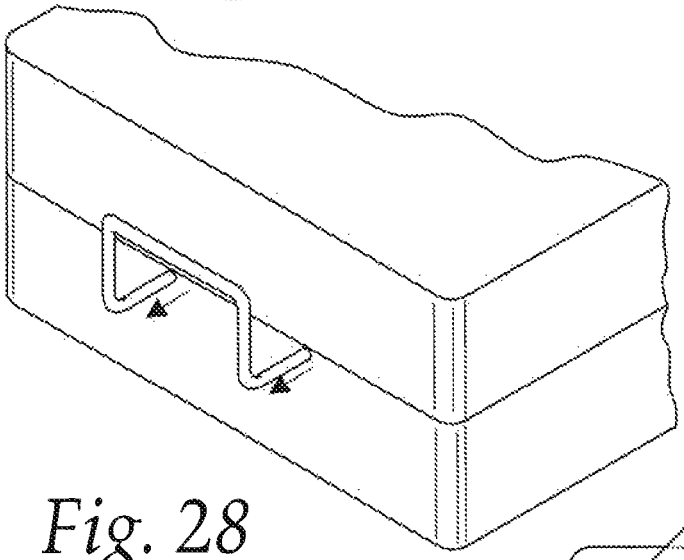


Fig. 28

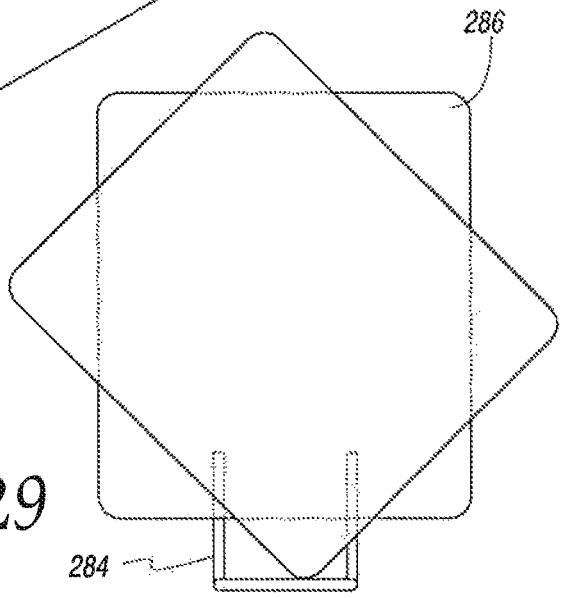


Fig. 29

Fig. 30

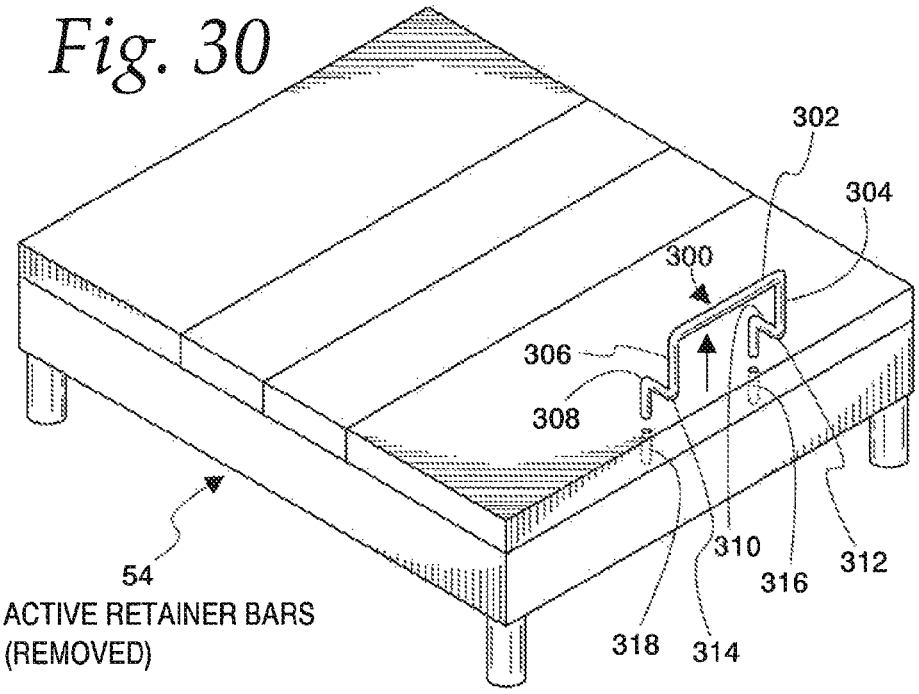

302
304
300
306
308
310
316
312
318
314
54
ACTIVE RETAINER BARS
(REMOVED)

Fig. 31

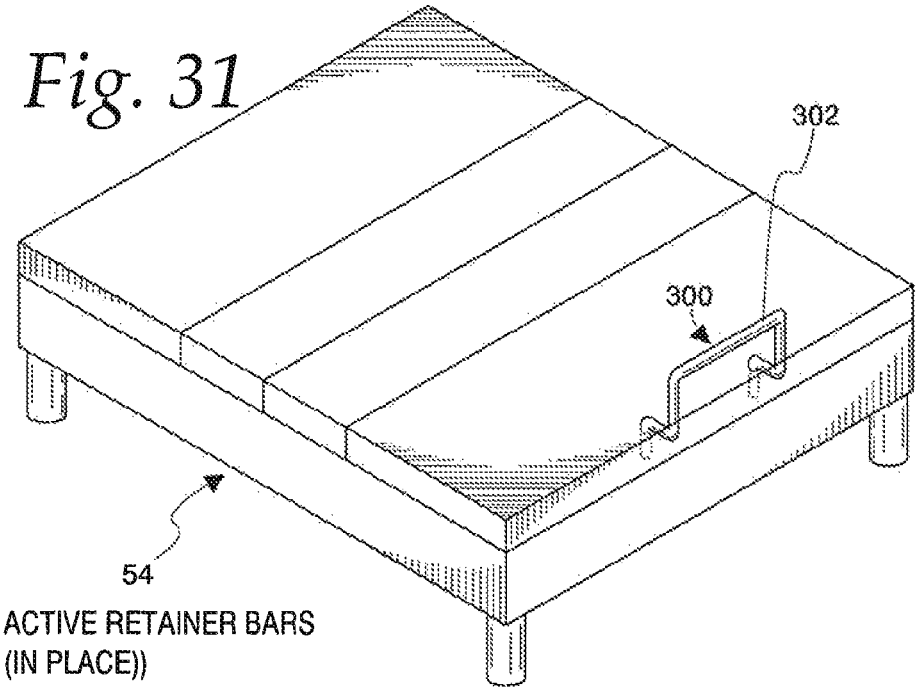

302
300
54
ACTIVE RETAINER BARS
(IN PLACE))

Fig. 32

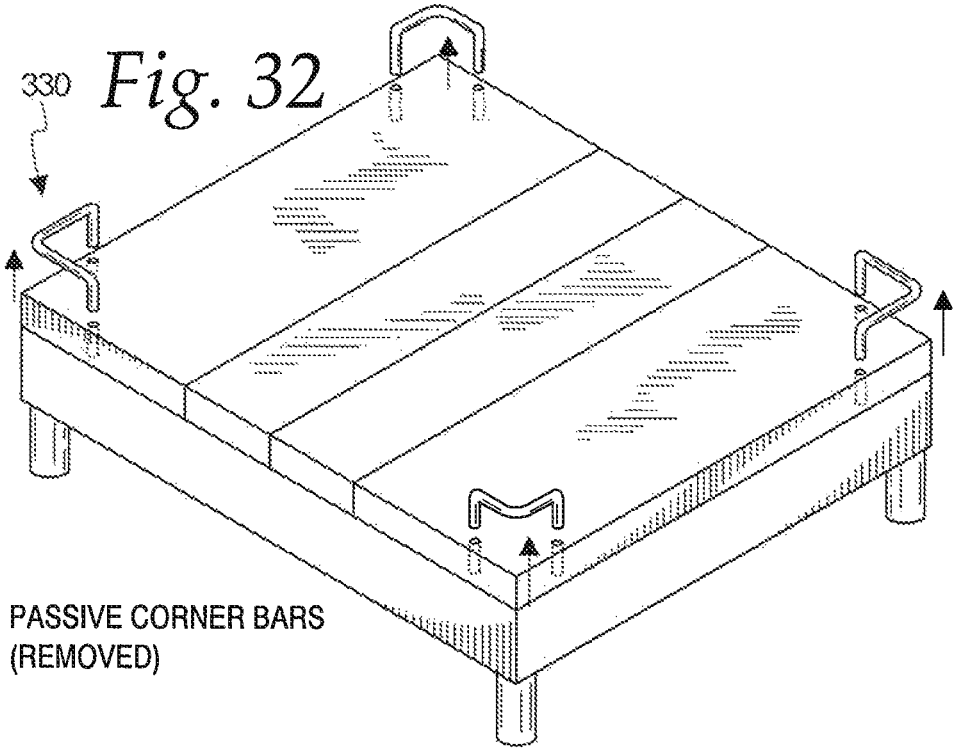
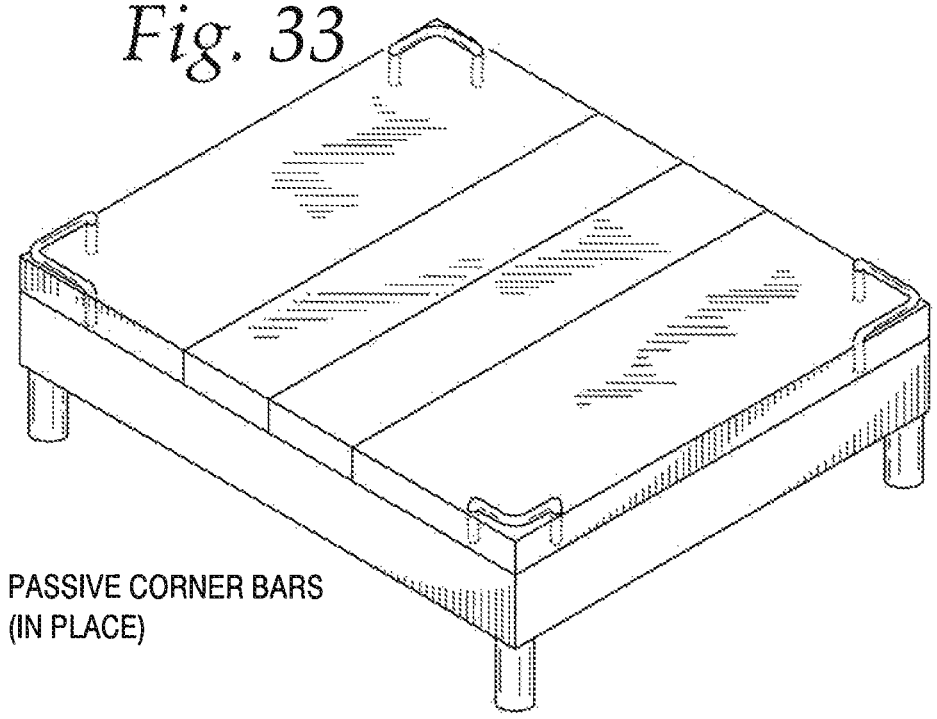

330
PASSIVE CORNER BARS
(REMOVED)

Fig. 33


PASSIVE CORNER BARS
(IN PLACE)

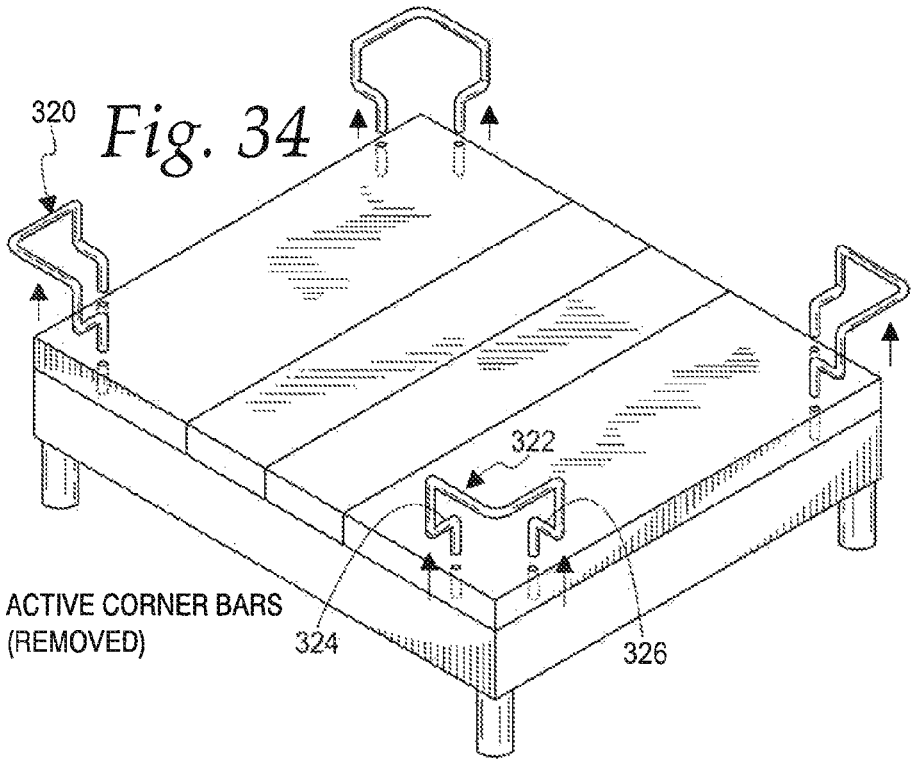

320
322
ACTIVE CORNER BARS
(REMOVED)
324
326

Fig. 34

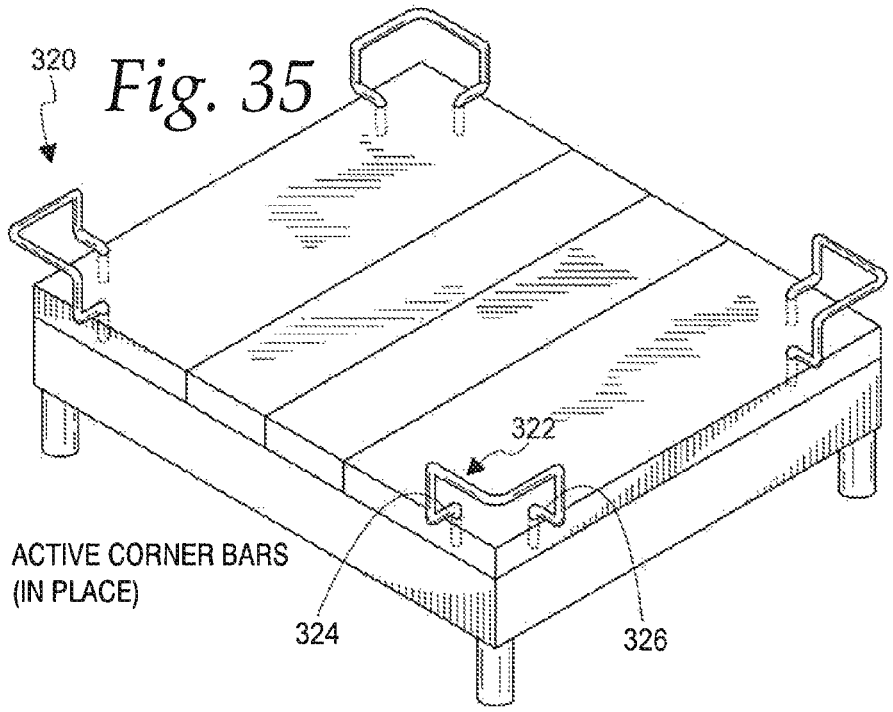

320
322
ACTIVE CORNER BARS
(IN PLACE)
324
326

Fig. 35

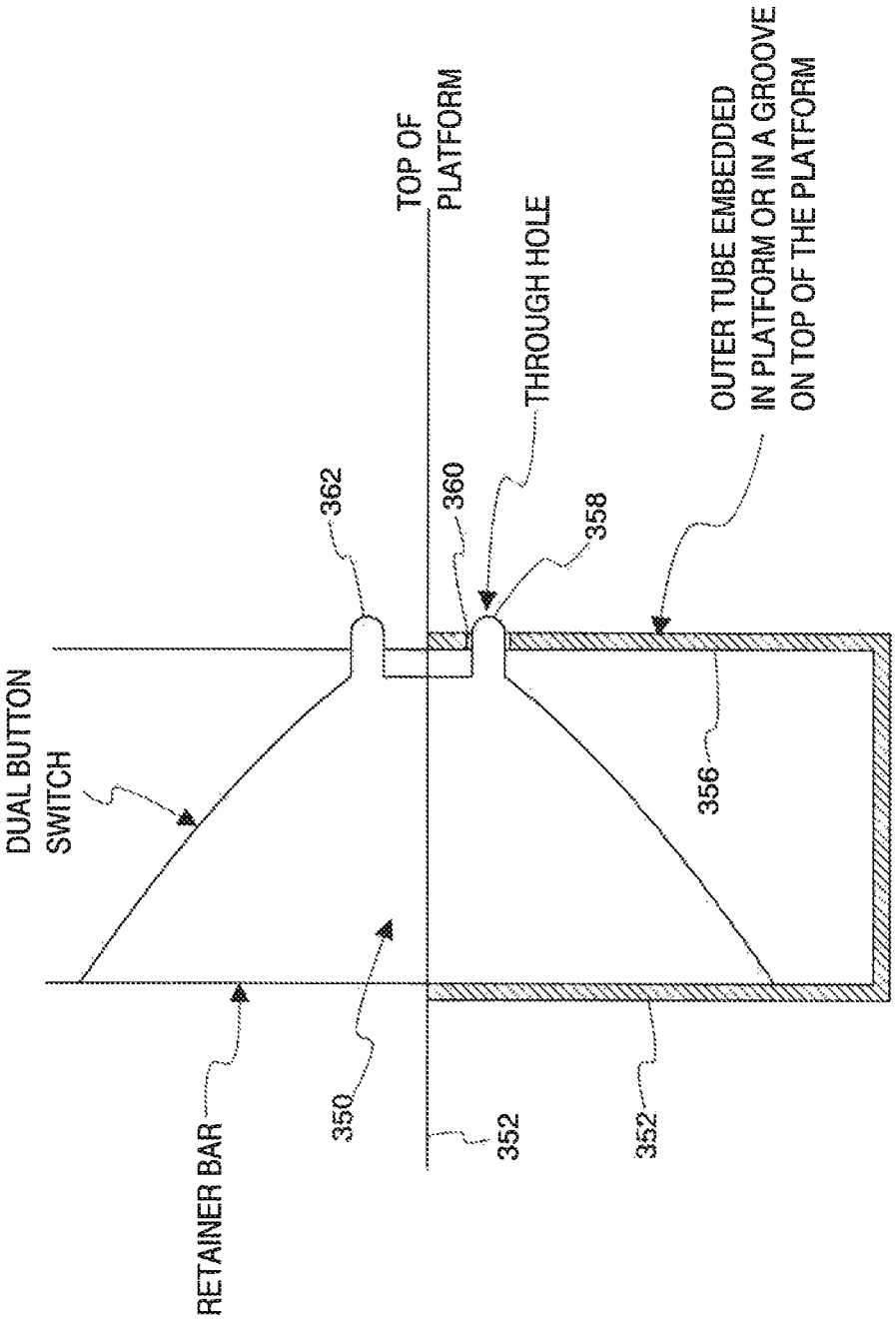

DUAL BUTTON SWITCH
RETAINER BAR
362
350
TOP OF PLATFORM
360
THROUGH HOLE
358
352
352
OUTER TUBE EMBEDDED IN PLATFORM OR IN A GROOVE ON TOP OF THE PLATFORM
356

Fig. 36

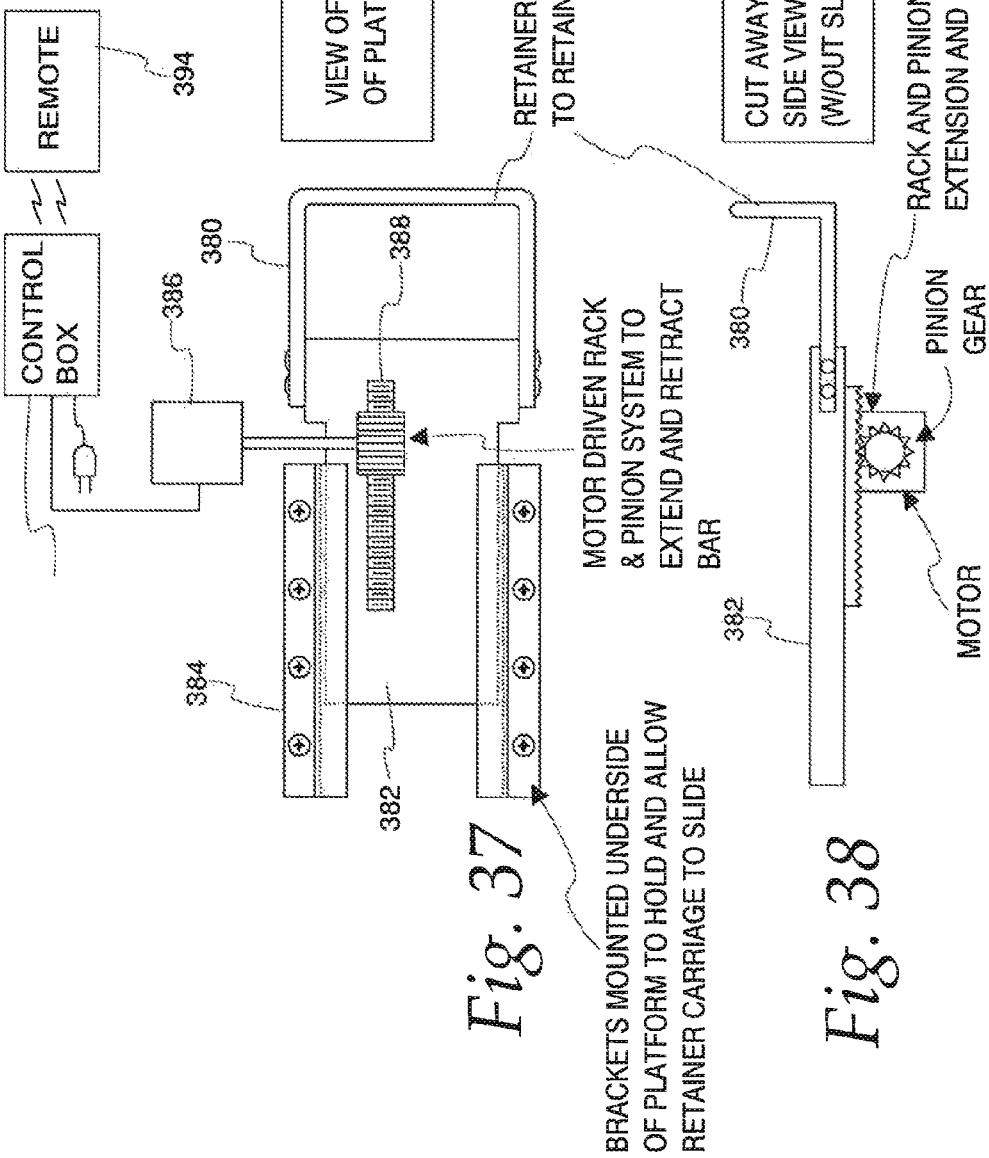

REMOTE
394
CONTROL BOX
386
380
388
384
382
VIEW OF UNDERSIDE OF PLATFORM
RETAINER BAR ATTACHED TO RETAINER CARRIAGE
MOTOR DRIVEN RACK & PINION SYSTEM TO EXTEND AND RETRACT BAR
BRACKETS MOUNTED UNDERSIDE OF PLATFORM TO HOLD AND ALLOW RETAINER CARRIAGE TO SLIDE
CUT AWAY SIDE VIEW (W/OUT SLIDE BRACKETS
RACK AND PINION RETAINER BAR EXTENSION AND RETRACTION SYSTEM
PINION GEAR
MOTOR

Fig. 37

Fig. 38

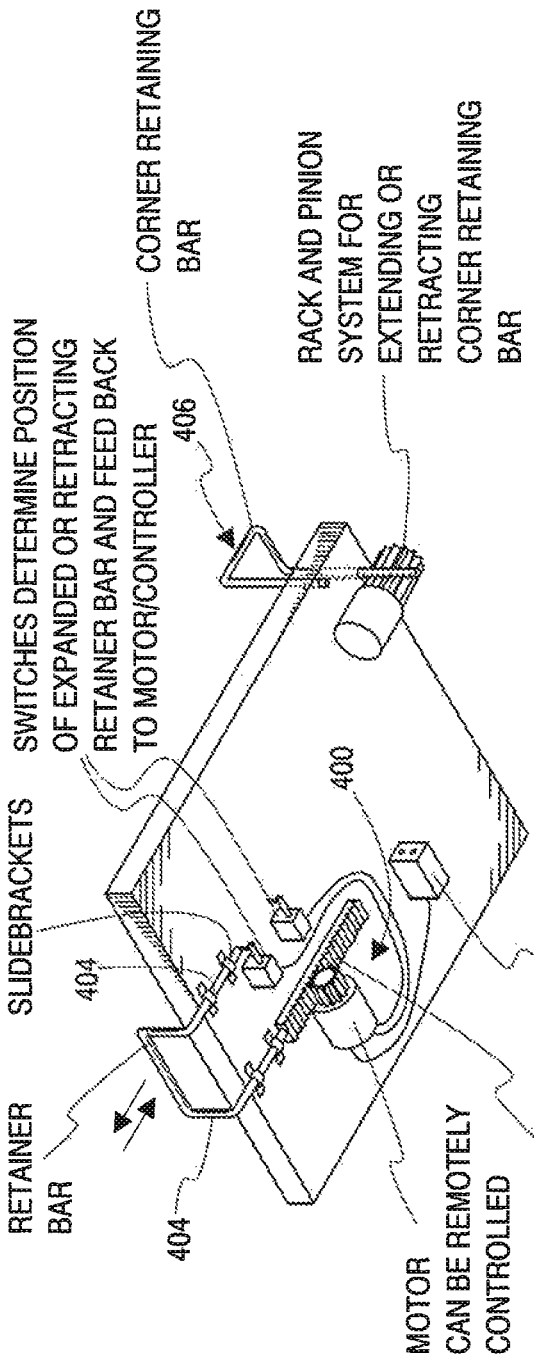

RETAINER BAR
SLIDEBRACKETS
404
404
SWITCHES DETERMINE POSITION OF EXPANDED OR RETRACTING RETAINER BAR AND FEED BACK TO MOTOR/CONTROLLER
CORNER RETAINING BAR
406
400
RACK AND PINION SYSTEM FOR EXTENDING OR RETRACTING CORNER RETAINING BAR
MOTOR CAN BE REMOTELY CONTROLLED
RACK AND PINION SYSTEM ALLOWS FOR RETAINER BAR TO BE EXTENDED OR RETRACTED
CONTROLLER CAN BE USED TO CONTROL MOTOR/CONTROLLER OR ACTUATE RETRACTION/ EXPANSION SEQUENCE
REMOTE CONTROL SIGNALS MOTOR/ CONTROLLER TO EXTEND OR RETRACT RETAINER BAR

Fig. 39

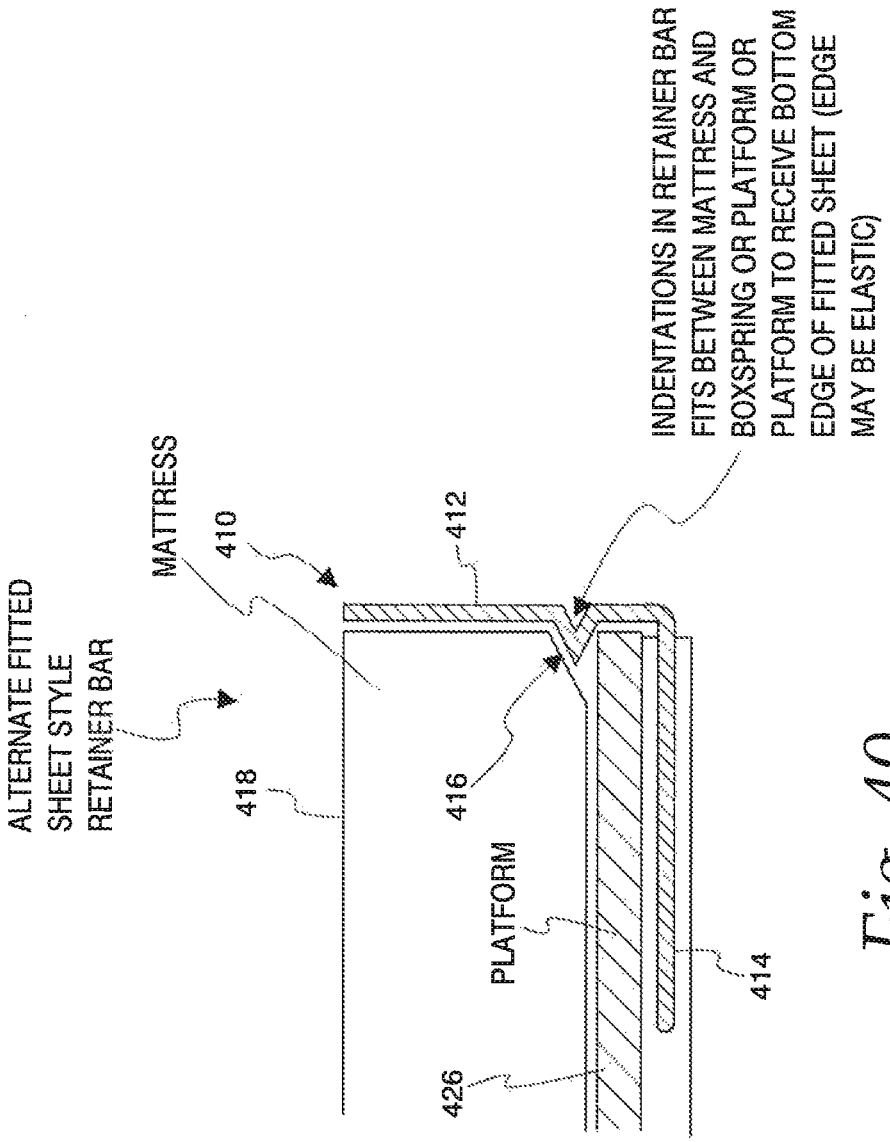

ALTERNATE FITTED SHEET STYLE RETAINER BAR
MATTRESS
410
412
INDENTATIONS IN RETAINER BAR FITS BETWEEN MATTRESS AND BOXSPRING OR PLATFORM OR PLATFORM TO RECEIVE BOTTOM EDGE OF FITTED SHEET (EDGE MAY BE ELASTIC)
418
416
PLATFORM
414
426

Fig. 40

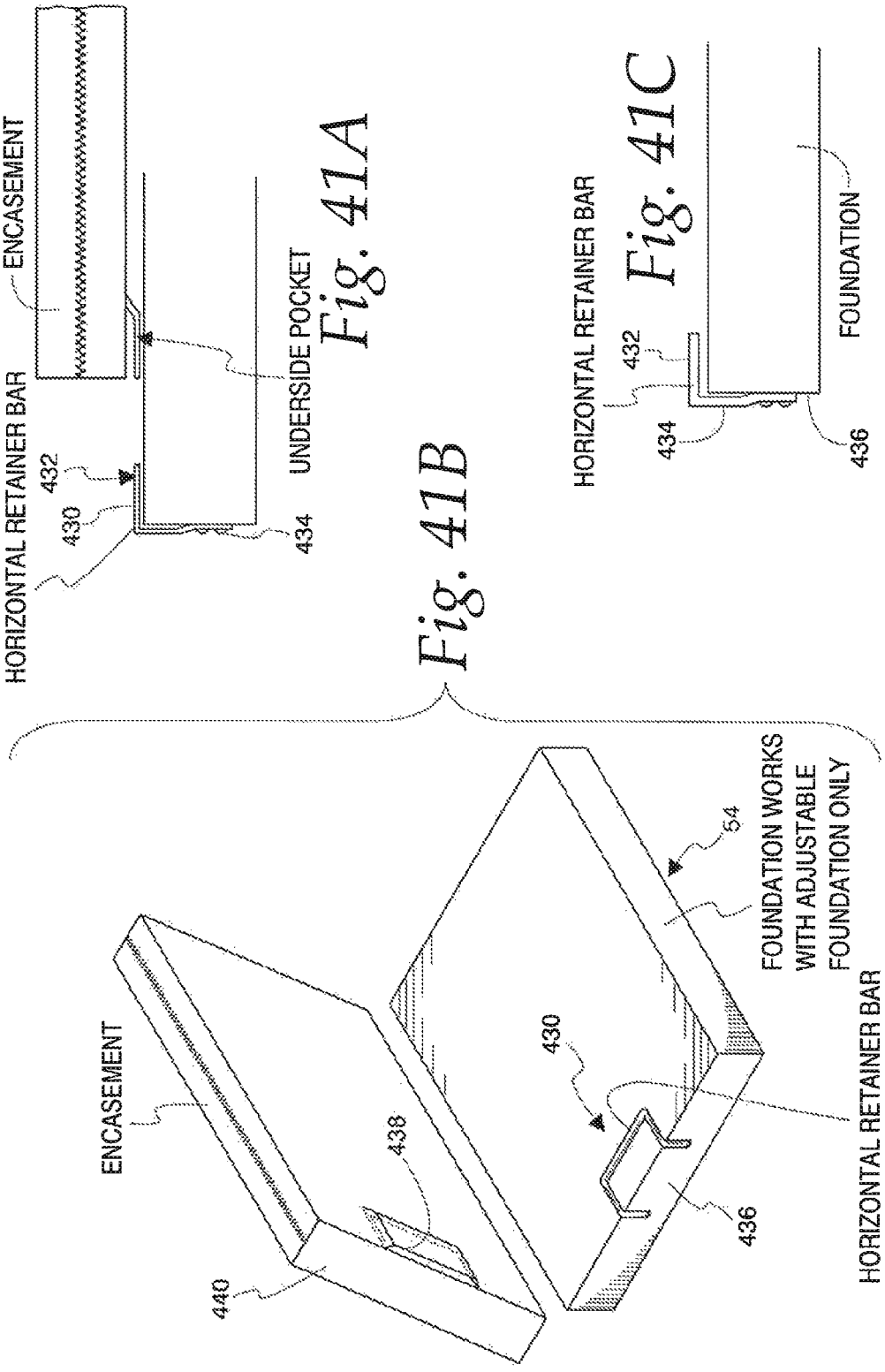


Fig. 41A

Fig. 41C

Fig. 41B

ADJUSTABLE MATTRESS RETAINER BARS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 14/304,385, filed on Jun. 13, 2014.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to mattress retainer bar system for retaining a mattress in place during positioning of an adjustable mattress platform assembly that includes one or more mattress retainer bars that are removably attached to the adjustable mattress platform assembly or can be positioned to enable the mattress to be rotated or slid off of the mattress platform assembly to install or launder or change a bed skirt or protective mattress encasement.

2. Description of the Prior Art

Conventional beds with adjustable platform assemblies are known for home use. An example of such a bed is disclosed in U.S. Pat. No. 7,810,194, hereby incorporated by reference. Such beds normally include a motorized adjustable mattress platform assembly and a mattress. The adjustable mattress platform assemblies allow the mattress to be contorted into various configurations. Some of those configurations can cause the mattress to move or slide out of position relative to the adjustable mattress platform assembly.

Such movement is highly undesirable. In order to prevent such movement, various methods have been developed to prevent movement of the mattress from moving as a result of positioning of the adjustable mattress platform assembly. In order to prevent such movement, various mattress retainer systems have been developed. Examples of such mattress retainer systems are disclosed in the following U.S. Pat. Nos. 6,684,425; and 7,810,194. Mattress retainer systems are also disclosed in the following US published applications: US 2010/0229309 A1 and US 2013/0185868 A1.

These mattress retainer systems fall into various categories. For example, some known mattress retainer systems are generally disposed at the head and/or foot end of the bed. Examples of this type of mattress retainer system are disclosed in U.S. Pat. Nos. 6,684,425; 7,353,550; and US Patent Application Publication No. US 2010/0229309 A1. Other known mattress retainer systems are used to restrain the corners of the mattress on the foot end of the bed. An example of this type of retainer system is disclosed in US Patent Application Publication No. US 2013/0185868 A1. Finally, other types of mattress retainer systems utilize fasteners to secure a mattress having a rigid substrate to an adjustable platform assembly. An example of this mattress retainer system is disclosed in U.S. Pat. No. 7,810,194.

Known mattress retainer systems can also be categorized by how they are disposed relative to the mattress and the platform. Several known systems rely on friction to retain the mattress retainer system in place.

One such system that relies on friction is disclosed in the '425 patent mentioned above. That system includes a mattress retainer bar disposed at one end of the bed that extends upwardly from the adjustable platform assembly. The retainer bar is connected to one or more frictional surfaces disposed between the underside of the mattress and the adjustable platform assembly. The combination of the retainer bar and the frictional surfaces are used to prevent the mattress from sliding toward the foot end of the bed when the head end of the mattress is lifted.

US Patent Application Publication No. US 2010 0229309 A1 is another type of mattress retainer system that relies on friction as well as clamping forces to hold the mattress retainer system in place between an adjustable platform assembly and a mattress. Specifically, the mattress retainer system includes a mattress retainer bar that is configured to be disposed so as to extend upwardly from adjustable platform assembly to retain the mattress in place. The mattress retainer bar is formed in a "C" shape defining a pair of spaced apart legs connected together at one end by a bight portion. A paper clip type arrangement is formed at the opposing end of the legs in a plane perpendicular to the plane of the mattress retainer bar. The paper clip arrangement is used to clip the mattress retainer bar to the adjustable platform assembly.

Both of the systems described above rely at least partially on friction to "secure" the mattress relative to the adjustable platform assembly. In particular, the mattress retainer system disclosed in '425 system relies totally on friction to secure the mattress retainer system relative to the bed. The '309 application relies on clamping forces as well as friction to secure the mattress retainer in place relative to the bed.

Such systems that rely on friction have a limited utility. In particular, such systems need to be designed to withstand the weight of the mattress as well as one or two occupants of the bed. In other words, the force of the weight will oppose the friction force.

Mattresses are relatively heavy items. The weight of a mattress varies as a function of the coil core, the gauge of the coil and the type of foam material used. An average king size mattress weighs between 85 and 115 pounds. High end king size mattresses with latex or memory foam can weigh as much as 300 pounds (mattressdirectonline.com). With two people on the bed, the force opposing the friction and the clamping forces could therefore be 600 pounds or more. Although the systems described above could likely provide satisfactory performance with older lighter weight mattresses, it would seemingly be impossible to provide a sufficient amount of friction to oppose a weight force with heavier mattresses when one end of the mattress is lifted, as discussed above.

As such, mattress retainer systems have been developed that are permanently secured to the adjustable platform assembly. Examples of such mattress retainer systems are disclosed in U.S. Pat. Nos. 7,353,550 and 7,810,194 as well as US Patent Application Publication No. 2013/0185868 A1. Although these mattress retainer systems solve the problem described above, such mattress retainer systems cause another problem.

In particular, a problem with these types of mattresses is that over time, the mattress materials lose their resiliency causing body depressions to develop. In order to even out the wear in the mattress, it is known to rotate the mattress in the horizontal plane to relocate the body depressions. In order to rotate a mattress with a permanently installed mattress retainer system, the mattress retainer system would have to be removed in order to rotate the mattress and re-installed after the mattress was rotated. Alternatively, the mattress could be lifted up high enough to clear the mattress retainer system; rotated and subsequently lowered into place. In order to rotate a mattress, the mattress must first be lifted and then rotated. Both methods are relatively cumbersome. Moreover, rotating a mattress is hard work. Depending on the weight of the mattress, rotating a mattress would

be virtually impossible for some people, such as senior citizens, as well as people that are handicapped or disabled and others.

Thus there is a need for a mattress retainer system that can be securely attached to the adjustable platform assembly while facilitating rotation of a mattress.

SUMMARY OF THE INVENTION

Briefly, the invention relates to a. mattress bar retainer system for use with adjustable mattress platforms. The mattress retainer bar system is used to prevent movement of the mattress during positioning of the adjustable mattress platform assembly. In a rotate mode of operation, one or more mattress retainer bars at the head/foot end and/or corners of the bed are removably attachable and re-installable to the mattress platform. In an alternate embodiment, the mattress retainer bars are configured to be positioned to enable the mattress to be rotated relative to the adjustable mattress platform in a rotate mode of operation. After the mattress is rotated to the desired position, the mattress retainer bars are restored to their normal position in a normal mode of operation. In an alternative embodiment, the retainer bars are motorized to enable the retainer bars to be positioned at the touch of a button on a control pad. In another embodiment of the invention, a retainer bar is disclosed for use with fitted sheets. In yet another embodiment, the retainer bar is secured to the mattress platform and received in a pocket in an underside of a mattress encasement.

DESCRIPTION OF THE DRAWING

These and other advantages of the present invention will be readily understood with reference to the following specification and attached drawing wherein:

FIG. **1** is an isometric view of a known adjustable platform assembly, shown in a contorted position illustrating the mattress retainer bars in accordance with the present invention attached to the corners on one end and to a foot end on the opposing end.

FIG. **2** is an isometric view of an un-formed bracket for use with the invention.

FIG. **3** an isometric view of the bracket illustrated in FIG. **2**, shown after it has been formed into a bracket for use with mattress retainer bars for the head and foot ends of the bed.

FIG. **4** is an isometric illustrating a section of the adjustable platform assembly and mattress with the bracket illustrated in FIG. **3** rigidly attached to one end of the adjustable platform assembly, shown with a mattress retainer bar removed.

FIG. **5** is a partial vertical section view of a portion of the mattress retainer bar, shown with a button pin arrangement in a detent position.

FIG. **6** is an isometric view of a portion of the adjustable platform assembly and mattress, shown with the bracket illustrated in FIG. **3** rigidly attached to the adjustable platform assembly and the mattress retainer bar partially installed in the bracket.

FIG. **7** is similar to FIG. **6** but shown with the mattress retainer bar in a fully retracted position and the mattress partially slid off the adjustable platform assembly.

FIG. **8** is similar to FIG. **2** but for a corner mattress retainer bar.

FIG. **9** an isometric view of the bracket illustrated in FIG. **8**, shown after it has been formed into a bracket for use with mattress retainer bars for the mattress corners.

FIG. **10** is an isometric illustrating a section of the adjustable platform assembly and mattress with the bracket illustrated in FIG. **9** rigidly attached to one corner of the adjustable platform assembly, shown with a mattress retainer bar removed.

FIG. **11** is an isometric view of a portion of the adjustable platform assembly and mattress, shown with the bracket illustrated in FIG. **10** rigidly attached to one corner of the adjustable platform assembly and the mattress retainer bar partially installed in the bracket.

FIG. **12** is similar to FIG. **11** but shown with the mattress retainer bar in a fully retracted position and the mattress partially slid off the adjustable platform assembly.

FIG. **13** is an isometric view of an un-formed bracket for use with an alternate embodiment of the invention.

FIG. **14** an isometric view of the bracket illustrated in FIG. **13**, shown after it has been formed into a bracket for use with an alternate embodiment of the invention for use as a mattress retainer bar for the head and foot ends of the bed.

FIG. **15** is an isometric view of a portion of the adjustable platform assembly and mattress, shown with the bracket illustrated in FIG. **14** rigidly attached to one end of the adjustable platform assembly and further shown with the mattress retainer bar in an extended position.

FIG. **16** is similar to FIG. **15** but shown with the mattress retainer bar in a fully retracted position and the mattress partially slid off the adjustable platform assembly.

FIG. **17** is an isometric view of an adjustable platform assembly shown with mattress retainer bars in accordance with the present invention installed on two corners and one end of the adjustable platform assembly, all shown in an extended position.

FIG. **18** is similar to FIG. **17** but shown with a mattress on top of the adjustable platform assembly.

FIG. **19** is similar to FIG. **18** but shown with the various mattress retainer bars all in a retracted position, illustrating rotation of a mattress.

FIG. **20** is an alternate embodiment of the mattress retainer system, illustrating a mattress retainer bar located at one end of the bed that pivots in a plane generally perpendicular to plane of the mattress, shown in a normal position.

FIG. **21** illustrates the mattress retainer system illustrated in FIG. **20** in an intermediate position.

FIG. **22** illustrates the mattress retainer system illustrated in FIG. **20** in an extended position.

FIG. **23** illustrates an alternate embodiment of the mattress retainer system illustrated in FIG. **20**, shown in an extended position.

FIG. **24** is an isometric view illustrating an alternate embodiment of the retainer bar system that is movable in a direction generally perpendicular to the plane of the mattress, shown in a retracted position with the normal position shown in phantom.

FIG. **25** is similar to FIG. **24** illustrating another alternate embodiment that is that is movable in a direction generally perpendicular to the plane of the mattress and removable, shown with the retainer bar removed.

FIG. **26** is a top view of a mattress illustrating another alternate embodiment of the invention in which the retainer bar is movable in a direction parallel to the plane of the mattress.

FIG. **27** is similar to FIG. **26** but shown in an extended position.

FIG. **28** is a partial isometric view of the embodiment illustrated in FIGS. **26** and **27**, shown with the retainer bar in an extended position.

FIG. **29** is a top plan view of a mattress and foundation and the retainer system illustrated in FIGS. **26-28** shown with a mattress partially rotated with respect to the foundation.

FIG. **30** is an isometric view of a mattress platform for an adjustable bed shown with one embodiment of a retainer bar in accordance with the present invention removed for use on head and/or foot ends of the mattress.

FIG. **31** is similar to FIG. **30** but shown with the retainer bar installed in the mattress platform.

FIG. **32** is an isometric view of a mattress platform for an adjustable bed shown with retainer bars for use in the corners of a mattress in accordance with the present invention, shown with the retainer bars removed.

FIG. **33** is similar to FIG. **32** but shown with the retainer bars installed in the mattress platform.

FIG. **34** is an isometric view of a mattress platform for an adjustable bed shown with an alternate embodiment of the corner retainer bars illustrated in FIGS. **32** and **33**, shown with the retainer bars removed.

FIG. **35** is similar to FIG. **34** but shown with the corner retainer bars installed in the mattress platform.

FIG. **36** is a partial section view in elevation of an exemplary latching assembly for latching and unlatching the retainer bar with respect to a bushing installed in the mattress platform for receiving the free ends of the retainer bars.

FIG. **37** is a bottom plan view of an exemplary embodiment of a motorized retainer bar.

FIG. **38** is cut away side view of the of the motorized retainer bar illustrated in FIG. **37**.

FIG. **39** illustrates an embodiment of the motorized retainer bars as applied to head/foot retainer bars as well as corner retainer bars in accordance with the present invention.

FIG. **40** illustrates an alternate embodiment of a retainer bar for use with fitted sheets.

FIG. **41**A illustrates a partial elevational view of an alternate embodiment of an "L" shaped retainer bar shown removed from a pocket on an underside of a mattress encasement.

FIG. **41**B is an isometric view of a mattress platform with the retainer bar illustrated in FIG. **41**A and a mattress encased with an encasement with a pocket on its underside for receiving the retainer bar, shown with the encased mattress removed.

FIG. **41**C is a partial elevational view of the "L" shaped retainer secured to a mattress platform.

DETAILED DESCRIPTION

The invention relates to a. mattress bar retainer system for use with adjustable mattress platforms. The mattress retainer bar system is used to prevent movement of the mattress during positioning of the adjustable mattress platform assembly. In a rotate mode of operation, one or more mattress retainer bars at the head/foot end and/or corners of the bed are removably attachable and re-installable to the mattress platform. In an alternate embodiment, the mattress retainer bars are configured to be positioned to enable the mattress to be rotated relative to the adjustable mattress platform in a rotate mode of operation. After the mattress is rotated to the desired position, the mattress retainer bars are restored to their normal position in a normal mode of operation. In an alternative embodiment, the retainer bars are motorized to enable the retainer bars to be positioned at the touch of a button on a control pad. In an alternate embodiment of the invention, a retainer bar is disclosed for use with fitted sheets. In yet another embodiment, the retainer bar is secured to the mattress platform and received in a pocket in an underside of a mattress encasement.

As will be discussed in detail below various embodiments of the mattress retainer bar systems are disclosed. For example, FIGS. **1**, **4-7**, **10-12**, **17** and **18** disclose embodiments of mattress retainer bar systems in which the retainer bar can be selectively lowered so that the top of the retainer bar is at a position below or flush with the underside of the mattress to allow the mattress to be rotated. Alternatively, the mattress retainer bars can be removed altogether. The mattress retainer bar systems disclosed in FIGS. **1** and **4-7** are suitable for use on the head or foot end of the bed. The mattress retainer bar systems disclosed in FIGS. **10-12** are for corners. FIGS. **17** and **18** illustrate an exemplary application of the retainer bars illustrated in FIGS. **1**, **4-7** and **10-12**.

FIGS. **15** and **16** illustrate embodiments of mattress retainer bar systems in which the mattress retainer bar can be rotated out of the way to enable the mattress to be rotated. FIGS. **20-23** illustrate mattress retainer bar systems in which one free end of mattress retainer bar is un-hooked from a bracket and the other free end is rotated so that the mattress retainer bracket is out of the way. These mattress retainer systems are suitable for use on the head or foot end of a bed.

FIGS. **24-31** illustrate embodiments of mattress retainer systems in which the retainer bars are removable and re-installable and can be used on the head/foot end of a bed. FIGS. **32-35** illustrate retainer bars for use on the corners of a bed. FIGS. **30**, **31**, **34** and **35** illustrate embodiments which rely on the weight of the mattress holding the retainer bar in place. These embodiments may be held in place by the weight of the mattress and optionally latch mechanisms, for example, as discussed below or other means. In the embodiments illustrated in FIGS. **24-29**, **32** and **33** these retainer bars may also be held in place by a latch mechanism, as discussed below or other means.

FIG. **36** illustrates an embodiment of an exemplary latch mechanism for use with the removable retainer bars, as discussed above, in accordance with the present invention. FIGS. **37-39** illustrate an exemplary embodiment of a motorized retainer bar system. FIG. **40** illustrates a retainer bar system for use with fitted sheets. FIGS. **41**A-**41**C illustrate an alternate embodiment of an "L" shaped retainer bar that is secured to the mattress platform and configured to be received in a pocket in an underside of a mattress encasement.

The retainer bar systems illustrated and described herein may be incorporated into the mattress platform **54** in various ways. For example, FIGS. **1-23** illustrate embodiments of the mattress retainer bar systems which utilize a bracket attached to the outside vertical wall of the mattress panel **54** (FIG. **1**). In the embodiments illustrated in FIGS. **1**, **4-7** and **10-12**, decorative fabric may be used to conceal the brackets. In the embodiments illustrated in FIGS. **15** and **16**, decorative fabric may be used to cover the bracket with a slit for the spaced apart rails **218** and **220** (FIG. **14**).

FIGS. **20-23** illustrate an alternate embodiment mattress retainer bar system that is attached to the outside vertical wall of the mattress panel **54**. In this embodiment, it is contemplated that the decorative cover is attached to the outside vertical wall of the mattress panel **54** and the brackets **258** and **260** are attached over the decorative fabric.

FIGS. **24-35** illustrate an alternate embodiment in which no part of the mattress retainer bar system is attached to the

outside vertical wall of the mattress panel **54**. As such, the outside vertical wall of the mattress panel **54** can be covered with a decorative fabric.

Referring first to FIG. **1**, a conventional adjustable mattress platform assembly is illustrated and identified with the reference numeral **50**. An example of such an adjustable mattress platform assembly is disclosed in detail in US Patent Application Publication No. US 2014/0325761 A1, hereby incorporated by reference. Such adjustable platform assemblies **50** are motorized and enable a user to select various contorted positions, normally by way of a remote control device (not shown). Known adjustable platform assemblies include a carriage assembly, generally identified with the reference numeral **52**, and mattress platform or upper support **54**. The mattress platform **54** is normally formed from a stiff material, such as upholstered wood, metal, or particle board) and is formed in sections, some of which are pivotally mounted with respect to the carriage assembly **52** in order to allow the contortions of the mattress into various user selected positions.

As shown in FIG. **1**, a mattress retainer bar **56** in accordance with the invention is disposed at one end of the adjustable platform assembly **50**. A pair of mattress retainers **58** and **60** in accordance with an alternative aspect of the invention is disposed on the corners of the upper support **54** of the adjustable platform assembly **50** on opposing corners.

Two types of mattress retainer assemblies in accordance with the invention are contemplated. One type is designed to be typically secured to the head or foot end of the upper support **54** of the adjustable platform assembly **50**. An exemplary version of this type of mattress retainer bracket is identified with the reference numeral **56** (FIG. **1**) and is also referred to as an "end" mattress retainer assembly. The end mattress retainer assembly can be used on the head and foot ends of the upper support **54** of the adjustable platform assembly **50**. The end mattress retainer assembly can also be used on the sides of the upper support of the adjustable platform assembly **50**. The second type of mattress retainer assembly is designed to be attached to one or more of the corners of the upper support **54** of the adjustable platform assembly **50** and is also referred to as a "corner" mattress retainer assembly. An exemplary version of this type of mattress retainer is illustrated in FIG. **1** and identified with the reference numerals **58** and **60**.

Multiple configurations of the mattress retainer bars **56**, **58** and **60** (FIG. **1**) with respect to their placement relative to the adjustable platform assembly **50** are possible. In particular, the mattress retainer bars **58** and **60** on the corners of the mattress platform **54** of the adjustable platform assembly **50** at the head end can be omitted. Alternatively, the mattress retainer bar **56** at the foot end of the adjustable platform assembly **50** can be omitted and replaced with mattress retainer bars **58** and **60** on the corners of the upper support **54** adjustable platform assembly **50** at the foot end. Alternatively, any number of retainer bars can be used at the head and foot of the adjustable platform assembly to hold the mattress in place.

The embodiments described and illustrated herein are merely exemplary. Other variations of head and foot end and corner mattress retainer assemblies are contemplated. The mattress retainer system in accordance with the present invention need only be either moveable or removable and re-installable and have a retracted position in which the mattress retainer bar is configured to retain the position of the mattress relative to the adjustable platform assembly **50** and an extended position in which the mattress retainer bar can selectively be placed below the top surface of the upper support **54** of the adjustable platform assembly **50**; and an optional mechanism for securing the mattress retainer bar in an extended position. All such embodiments which meet the above criteria are considered to be within the broad scope of the invention.

As mentioned above, the mattress retainer assembly in accordance with the present invention may include a bracket, a mattress retainer bar and a mechanism. An exemplary embodiment for one such bracket for an end type mattress retainer assembly is illustrated in FIGS. **2** and **3**. As shown in FIG. **2**, the bracket, general identified with the reference numeral **70**, can be stamped from a blank consisting of a flat piece of rigid material. As shown the blank includes a top flange portion **72** that is designed to be secured to a top surface of the upper support **54** of the adjustable platform assembly **50** and a bracket portion **73**. The flange portion **72** is formed by providing opposing aligned slits **74** and **76** on opposing ends of the blank and spaced from the top of the blank to define the width of the flange portion **72**. The blank may be under scored between the opposing slits **74** and **76**, as indicated by the dashed line **77**, to facilitate bending of the flange portion **72** so that it is generally perpendicular to the plane of the bracket portion **73**. A pair of mounting holes **78** and **80** is provided in the flange portion **72** to enable the bracket **70** to be secured to a top surface of the upper support **54** of the adjustable platform assembly **50** with suitable conventional fasteners. A number of aligned spaced apart tabs, generally identified with the reference numeral **82**, are formed adjacent opposing ends of the bracket. As shown, four tabs are shown on each end. As shown in FIGS. **3**, **4**, **6** and **7**, the tabs **82** are bent upwardly to a position generally perpendicular to the bracket portion **73**. Through holes **83**, **84** and **85**, **86** are formed adjacent opposing ends of the bracket portion **73**. In this exemplary embodiment the through holes **83**, **84** and **85**, **86** form part of the detent mechanism. As will be discussed in more detail below, the through holes **83** and **85** are define an extended position while the holes **84** and **86** may be used to define a retracted position or eliminated altogether.

Each end of the bracket portion **73** is under scored with a pair of parallel spaced apart scores **88**, **90** and **92**, **94**. These under scores are used to facilitate bends along the ends of the bracket portion **73**. Specifically, the bends **90** and **92** facilitate the bends **100** and **102** while the under scores **88** and **94** facilitate the bends **104** and **106**. The bends **100** and **104** form a sidewall portion **108** and a top wall portion **110** on one end of the bracket portion **73**. Similarly, the bends **102** and **106** form a sidewall portion **112** and a top wall portion **114**.

A portion of the bracket portion **73**, the side wall **108**, the top wall **110** as well as the tabs **82**, bent up toward the top wall **110** form a cavity for receiving and providing a track for one leg of a mattress retainer bar. Similarly, a portion of the bracket portion **73** on an opposing end, the side wall **112**, the top wall **114** as well as the tabs **82**, bend up toward the top wall **114** to form a cavity for receiving and providing a track for the other leg of a mattress retainer bar.

With reference to the embodiments illustrated in FIGS. **4-7**, this mattress retainer system includes a mounting bracket **70** (FIG. **3**) that may be secured to one end the mattress panel **54** (FIG. **1**) of the adjustable platform assembly **50**; a mattress retainer bar **126** (FIG. **4**); and an exemplary latch or other mechanism **128**. The mechanism **128** is used to latch the mattress retainer bar in a fully extended position, for example, as illustrated in FIG. **18**, or alternatively allow the mattress retainer bar to be placed in a retracted position, as illustrated in FIG. **19** to allow the

mattress to be rotated with respect to the upper support **54** of the adjustable platform assembly **50**.

One embodiment of a mattress retainer bar for an end mattress retainer assembly is best illustrated in FIG. **4** and generally identified with the reference numeral **120**. The mattress retainer bar includes a pair of spaced apart legs **122** and **124** connected together by a bight portion **126**. As shown in FIG. **4**, the opposing legs are received in the cavities formed in the bracket as discussed above.

As illustrated in FIG. **5**, the mattress retainer bar **120** is formed from a hollow tube and includes a mechanism consisting of a spring loaded button, generally identified with the reference numeral **128** which is formed from a spring **130** and a button **132**. Each of the legs **122** and **124** are formed with a through hole. These through holes **134** are for receiving the spring loaded button **132**, as illustrated in FIG. **5**.

As mentioned above, each of the legs **122** and **124** is received in the cavities formed on the opposing ends of the bracket **70**. The mattress retainer bar **120** is inserted into the cavities until the button **132** on each leg **122**, **124** is received in the top most holes **83** and **85** (FIGS. **2** and **4**) formed in the side walls **108** and **112**. The cavities are sized such that as the respective legs **122** and **124** are inserted into the cavities, the respective buttons **132** on each of the legs **122**, **124** is pushed inwardly against the force of the spring **130**. As the buttons **132** become aligned with the holes **83** and **85** (FIG. **2**) in the cavities, the buttons **132** are pushed out under the force of the springs **130** and are received in the holes **83** and **85** to define a first position or extended position, as illustrated in FIG. **6**.

As shown in FIG. **6**, a mattress **150** is supported on top of a support surface of an adjustable platform assembly **50**. A bracket **70** is mounted to the support surface **54** of the spring retainer assembly **50**. With the mattress retainer bar **120** in an extended position, as shown, the mattress **150** is constrained from moving in the direction by the arrow **152**, as shown in FIG. **7**.

In order to place the spring retainer bar in a retracted position, as shown in FIG. **7**, the buttons **132** on the legs **122** and **124** of the mattress retainer bar **120** are pushed inwardly against the force of the springs **130**. The spring retainer bar **120** is moved further downwardly in the direction of the arrow **151** until the buttons **132** pop into the holes **84** and **86** (FIG. **2**) in the bracket **70**, which defines a second detent position or a retracted position, as shown in FIG. **7**. In a retracted position, as shown in FIG. **7**, the mattress retainer bar is below the top surface of the upper support **54** of the adjustable platform assembly **50** to allow the mattress to move in the direction of the arrow **152**, past the plane of the mattress retainer bar **120** to enable the mattress to slide or be rotated.

The holes **84** and **86** in the bracket **70** can optionally be omitted. In this embodiment, downward travel of the mattress retainer bar will be limited by the bight portion **126** of the mattress retainer bar **120** striking the top tabs **82** on the bracket **70**.

FIGS. **8-12** relate to corner mattress retainer assemblies. The construction of the bracket **160** for the corner mattress retainer **58**, **60** (FIG. **1**). The bracket **160** for the corner mattress retainer assembly **58**, **60** is similar to the bracket **70** for the end mattress retainer assembly **56**. For brevity, only the differences will be discussed. All of the rest of the manufacturing details are the same.

Referring first to FIG. **8** a "V" **162** is cut out of the center of the top edge of the bracket **160**. In addition, the center of the bracket **160** is under scored, as indicated by the dotted line **164**. These additional details allow the bracket **160** to be bent along the under score **164** forming two halves that are mutually perpendicular to each other, as shown in FIG. **9**.

The mattress retainer bar **166** (FIG. **10**) for the corner mattress retainer assembly **58**, **60** (FIG. **1**) and includes a pair of spaced apart parallel legs **166** and **168** connected together by a bight portion **172**. The bight portion **172** is bent and follows the radius of curvature of the rounded mattress corner **174**.

The mattress retainer bar **166** is formed from a hollow tube and includes a mechanism, as discussed above. As shown in FIG. **11**, the mattress retaining bar **166** is received in the cavities formed in the bracket **160** and moved downwardly in the direction of the arrow **175** until the mechanism, such as the mechanism discussed above, reaches the extended detent position. In this position the mattress is restrained from moving beyond intersecting planes of the bracket **160**.

In order to move the mattress in the direction of the arrow **176**, the mattress retainer bar is moved to the retracted position, as shown in FIG. **12**. In this position, the mattress retainer bar is below the bottom surface of the mattress **152** in order to allow the mattress **152** to slide in the direction of the arrow **176** or be rotated.

FIGS. **13-16** illustrate an alternative embodiment of an end mattress retainer assembly. This embodiment also includes a bracket **180**. This embodiment includes a pivotally mounted mattress retainer bar **182** (FIG. **15**). The bracket **180** can be stamped from a blank consisting of a flat piece of rigid material. As shown the bracket **180** includes a top flange portion **182** that is designed to be secured to a top surface of the upper support **54** of the adjustable platform assembly **50**. The bracket **180** also includes a bottom flange portion **184** and a bracket portion **186**. The top flange portion **182** is formed by providing opposing aligned slits **187** and **188** on opposing ends of the blank and spaced from the top of the blank to define the width of the top flange portion **182**. The blank may be under scored between the opposing slits **187** and **188**, as indicated by the dashed line **190**, to facilitate bending of the top flange portion **182** so that it is generally perpendicular to the plane of the bracket portion **186**. A pair of mounting holes **192** and **194** is provided in the top flange portion **182** to enable the bracket **180** to be secured to a top surface of the upper support **54** of the adjustable platform assembly **50** with suitable conventional fasteners.

The bottom flange portion **184** is disposed on the underside of the upper support surface **54**, as generally shown in FIGS. **15** and **16**. In order to form the lower flange portion **184**, an under score is provided, as indicated by the dashed line **189**. Two slits **200** and **202** are provided adjacent opposing edges of the bracket **180** along with two perpendicular under scores **204** and **206**. As shown best in FIG. **14**, such a configuration allows the lower flange port **184** to be bent along the line **210**.

A pair of under scores **212** and **214** adjacent opposing edges of the bracket **180**. These under scores allow the edges to be bent in a generally perpendicular direction from the bracket portion **186** defining a pair of spaced apart side walls Each of the side walls **218** and **220** includes a pair of through holes **222**, **224** and **226**, **228**. The holes **224** and **228** form a pivot axis. The though holes **222** and **226** form part of the detent mechanism, as will be discussed in more detail below.

Turning to FIGS. **15** and **16**, the mattress retainer bar **182** is similar to the mattress retainer bars discussed above with the exception that it is pivotally mounted relative to the rails or sidewalls **218** and **220**. The configuration of the bottom

flange portion **184** allows the pivot axis to extend below the bottom surface of the upper support **54**.

FIG. **15** illustrates an extended position. Spring loaded buttons (not shown) in the mattress retainer bar **182** are received in the holes **222** (FIG. **14**) and **226** in the side walls **218** and **220**, respectively to secure the mattress retainer bar **182** in the extended position, as shown in FIG. **15** to prevent movement of the mattress **152** with respect to the upper support **54** of the platform assembly **50**.

In order to slide the mattress **152** in the direction of the arrow **230** or rotate the mattress **152**, the spring loaded buttons (not shown) are pushed inwardly and the mattress retainer bar **182** is rotated in the direction of the arrow **232** to allow the mattress retainer bar to be rotated to the extended position, as shown in FIG. **16**. In this position, the mattress retainer bar **182** is below the top surface of the upper support **54** of the adjustable platform assembly **50** to allow the mattress **152** to be moved in the direction of the arrow **230** and rotated.

FIG. **17** illustrates an exemplary application of the invention. In this embodiment, an end mattress retainer assembly **56** is disposed at a foot end of an upper support of an adjustable support assembly **50** and corner mattress retainer assemblies **58** and **60** are disposed on opposing corners at the head end. FIG. **18** illustrates a mattress disposed on top of the upper support **54** of an adjustable support assembly **50** in a flat position. As shown the mattress retainer assemblies **56**, **58** and **60** are latched in an extended position. In order to rotate the mattress **152** in the direction of the arrow **234**, the head mattress retainer assembly **56**, as well as the corner mattress retainer assemblies **58** and **60** are placed in a retracted position, as shown. After the mattress **152** is rotated 180 degrees, the head mattress retainer assembly **56** and the corner mattress retainer assemblies **58** and **60** are returned to an extended position, as shown in FIGS. **17** and **18**.

FIGS. **20-22** illustrate another alternate embodiment of a mattress retainer system, which includes a U-shaped retainer bar **250** that pivots on one end about a pivot axis. In this embodiment, the retainer bar **250** rotates in a clockwise direction so that a knee **252** on the fixed end of the retainer bar **250** below or flush with a top surface of a platform **254**. The pivot axis **256** is rigidly secured to the platform **254** along an axis generally parallel to the plane of the platform **254** in a rest position, as shown in FIG. **20**.

The mattress retainer bar system illustrated in FIGS. **20-22** includes two retaining brackets **258** and **260**. These brackets **258** and **260** hold the retainer bar **250** against the side of the platform **254** in a normal position, as shown in FIG. **20**. These brackets **258** and **260** restrain movement of the retainer bar **250** in a direction parallel to the pivot axis **256** in a direction out of the page with respect to FIG. **20**. The bracket **258** is located adjacent the pivot axis **256** and also acts as a stop to prevent counter-clockwise rotation beyond a normal position. The bracket **260** is located adjacent a free end of the retainer bar **250**. The bracket **260** also acts as a stop and prevents clockwise rotation in a normal position.

With reference to FIG. **21**, operation of the mattress retainer system is illustrated. In order to rotate the retainer bar **250**, one leg **252** is bent slightly toward the pivot axis **256** to free the retainer bar **250** from the bracket **260**. Once the retainer bar **250** is free from the bracket **260**, the retainer bar **250** is rotated in a clockwise direction, as shown in FIG. **22** until the knee **252** of the retainer bar **250** is flush or below the plane of the top surface of the platform **254** defining an extended position.

Once the retainer bar **250** is in an extended position as shown in FIG. **22**, the mattress (not shown) can be freely rotated with respect to the platform **254**. Once the mattress is rotated to its desired position, the retainer bar **250** is rotated counter-clockwise and the leg **262** is latched with respect to the bracket **260** to return the retainer bar **250** to its normal position, as illustrated in FIG. **20**. As mentioned above, the bracket **258** serves to stop counter-clockwise rotation of the retainer bar **250** once the retainer bar **250** is in a normal position, as illustrated in FIG. **20**. The bracket **260** serves to stop clockwise and counter clockwise rotation of the retainer bar **250** once the retainer bar **250** is in a normal position, as illustrated in FIG. **20**. Both brackets **258** and **260** hold the retainer bar **250** against the sides of the foundation or platform to hold the retainer bar **250** in an upright position to hold mattress in position relative to the foundation and keep it from sliding off of the foot of the bed.

FIG. **23** is an alternate embodiment of the mattress retainer system illustrated in FIGS. **20-22**. In this embodiment, the direction of rotation from a normal position to an extended position is counter-clockwise, as shown. The bracket **260** is the same but the orientation of **258** is flipped as shown to allow counterclockwise rotation of the retainer bar **250**.

In the embodiments illustrated in FIGS. **24-35**, sleeves or bushings are concealed in the mattress panel **54**. These sleeves are used to receive the free ends of the retainer bars. In the embodiments illustrated in FIGS. **24** and **25** and **30-35**, vertical sleeves, generally parallel to outside vertical wall of the mattress panel **54** are mostly or completely concealed in the mattress platform panel **54** (FIG. **1**). In the embodiments illustrated in FIGS. **24** and **25**, the retainer bar system may be configured so that the retainer bar can be completely removed, as illustrated in FIG. **25** or pushed down out of the way so that the top of the retainer bar is below or flush with the underside of the mattress. In the latter embodiment, a notch parallel to the horizontal portion of the retainer may be formed in a top surface of the mattress panel **54** so that the horizontal bar is either flush or below the bottom surface of the panel. An exemplary latch mechanism, as illustrated in FIG. **36** may be used to secure retainer bar sleeves that are concealed by the mattress platform, as discussed below.

Referring to FIGS. **24** and **25**, an alternate embodiment of the mattress retainer bar system in which a C-shaped retainer bar **270** is movably attached to one end of the mattress panel **272**. In both embodiments, the retainer bar **270** is movable in a direction that is generally perpendicular to the plane of the mattress panel **272**. In particular, wells or sleeves **274** and **276** are formed in the platform **272**, as shown, and configured to receive the legs **278**, **280** of the retainer bar **272**. Alternatively, the wells **274** and **275** can be formed by tube shaped brackets attached to the side of the platform or foundation to receive the ends of the retainer bar **270**. In the embodiment shown in FIG. **24**, the retainer bar **274** is pushed downwardly to a retracted position to enable a mattress **274** to be rotated with respect to the platform **272**. In the embodiment illustrated in FIG. **25**, the retainer bar **270** is removable.

Referring to FIGS. **26-29**, an alternate embodiment of the retainer bar system is illustrated. In this embodiment, the sleeves in the mattress panel **54** are parallel to the plane of the mattress panel. In this embodiment, the retainer bar has a normal position, as shown in FIG. **26** and an extended position, as shown in FIG. **27**. As shown in FIGS. **28** and **29**, in the extended position, the retainer bar is extended far enough to allow the mattress to rotate.

FIGS. **26-28** are similar to FIGS. **24** and **25** except the wells **280** and **282** for receiving the retainer bar **284** are formed in the platform **286** (FIG. **29**) in a direction parallel to the plane of the platform **286**. Alternatively, the wells or sleeves can be formed by tube shaped brackets attached to the top of the platform or foundation to receive the ends of the retainer bar **270**. In this embodiment, the retainer bar **284** is movable in a direction generally parallel to the direction of the plane of the platform **286**. FIG. **26** illustrates a normal position while FIGS. **27-29** illustrate extended positions. Once the retainer bar **284** is extended, the mattress **287** can be rotated as shown in FIG. **29**.

With reference to FIGS. **30-35**, various configurations for mattress retainer bars suitable for the head and foot ends of the bed as well as corner bars. These mattress retainer bars can be categorized in two groups. One group which includes the embodiments illustrated in FIGS. **30**, **31**, **34** and **35** are suitable for use in active mattress rotation applications, for example, as set forth in U.S. Pat. Nos. 8,006,331; 8,246,706; 8,549; and 8,863,326; all hereby incorporated by reference. The other group which includes the embodiments illustrated in FIGS. **24**, **25**, **32** and **33** are suitable in passive mattress rotation systems, for example, as set forth in U.S. Pat. No. 8,510,880, hereby incorporated by reference.

With reference to **30** and **31**, the active mattress retainer bar **300** includes a top horizontal bar **302** and parallel spaced apart legs **304** and **306** attached to the ends of the top horizontal bar **302**. The legs **304** and **306** are generally perpendicular relationship with the top horizontal bar **302**. A pair of supports **308** and **310** is attached to the free ends of the legs **304** and **306**. The supports **308** and **310** are parallel to each other and perpendicular to the legs **304** and **306** and extend outwardly therefrom forming an "L" shape with the legs **304** and **306**. Spaced apart parallel inserts **312** and **314** are attached to the free ends of the supports **308** and **310**. The inserts **312** and **314** are generally parallel to the legs **304** and **306** and are generally perpendicular to the supports **308** and **310**. The **312** and **314** are configured to be received in the sleeves or bushings **316** and **318** disposed in the mattress platform **54** generally perpendicular thereto.

In this embodiment the weight of the mattress (not shown) may be used to hold the mattress retainer bar **300** in place in a normal mode of operation. In particular, in these embodiments, the mattress rests on the supports **308**, **310**. When it is desired to rotate the mattress, the active mattress rotation system is activated to raise the mattress. Once the mattress is levitated, relieving the weight on the mattress retainer bar **300**, the mattress retainer bar **300** can be removed, as shown in FIG. **30** in a rotate mode of operation, and the mattress rotated. Once the mattress is in the desired position, the mattress retainer bar **300** is re-installed, as shown in FIG. **31**, while the mattress is still levitated in a normal mode of operation. Once the mattress retainer bar **300** is in place, the active mattress rotation system can be de-activated, allowing the mattress to be reseated on the mattress panel **54**.

FIGS. **34** and **35** illustrate active mattress retainer bars **320** for use on the corners. FIG. **34** illustrates a rotate mode of operation, while FIG. **35** illustrates a normal mode of operation. The corner mattress retainer bar **320** is similar to the mattress retainer bar **300** used on the head or foot end of a mattress platform **54**. The only differences is that the top bar **322** and the supports **324** and **326** are angled, for example, at a 90° angle.

It is to be noted that the sleeves **316** and **318** illustrated in FIGS. **30** and **31**, as well as the sleeves illustrated in FIGS. **34** and **35**, may be spaced relative to the edge of the mattress platform **54** so that the sides of the mattress will be in contact with the retainer bars **300** and **322**. It is also contemplated that the sleeves can orientated to be generally parallel to the plane of the mattress platform **34**. In such an embodiment, the inserts **312** and **314** are eliminated. The supports **308**, **310** are received directly into the sleeves. The top of the mattress panel **54** may be notched to receive the sleeves and the supports

The passive retainer bars **270** for use on a head or foot end of a bed, illustrated in FIGS. **24** and **25** are discussed above. The passive corner mattress retainer bars, generally identified with the reference numeral **330**, are similar to the retainer bar **270** except that the top horizontal bar is angled at 90°. FIGS. **24** and **32** illustrate a rotate mode in which the retainer bars **270** and **330** are removed. FIGS. **25** and **33** illustrate a normal mode in which the mattress retainer bars are re-installed.

As illustrated in FIG. **19**, once the removable mattress retainer bars are removed, the mattress can be rotated. Once the mattress is in the desired position, the mattress retainer bars can be re-installed. Alternatively, the mattress retainer bars can be pushed down. A notch may be formed in the mattress platform so that the retainer bar is either flush or below the underside of the mattress. The embodiments illustrated in FIGS. **15**, **16**, **20-23** and **26-28** allow the mattress retainer bar to be positioned in a rotate mode. In these embodiments, the retainer bars are positioned so as not to interfere with the rotation of the mattress. The mattress is then rotated, for example, as illustrated in FIGS. **19** and **29**. Once the mattress is in the desired position, the mattress retainer bars can be re-positioned to a normal mode, for example, as illustrated in FIGS. **15**, **20** and **26**.

In addition to rotation of a mattress, once the mattress retainer bars are removed or otherwise positioned below or flush with the surface of the bottom of the mattress, the mattress can be slid off of the mattress platform assembly to install or launder or change a bed skirt or protective mattress encasement, for example as illustrated in US Patent Application for a Passive Mattress Management System, Publication No. US 2013/02012,809 A1 and US Patent Application for a Four in One Mattress Management System, Publication No. US 2013/0269,108 A1, hereby incorporated by reference. Once the bed skirt is installed, the mattress can be re-installed and the retainer bars extended or positioned to the extended or normal positions that prevent movement of the mattress relative to the platform.

FIGS. **5** and **36** illustrate exemplary latch assemblies for all of the embodiments in which the retainer bars are removable. The latch **128**, illustrated in FIG. **5**, is suitable for applications in which the sleeve for receiving the retainer bar is accessible, for example, as illustrated in FIG. **4**. A suitable latch **128** is a single button latch-type snap button, available, for example, from Valco Valley Tool & Die, Inc. (valcocleve.com/). Other latch mechanisms are contemplated.

In this application, a through hole is provided in the outer sleeve **108**. A spring loaded button **132** is received in a through hole formed in each of the legs **122** and **124** of the retainer bar **120**. During insertion, the buttons **136** are depressed as the legs **122** and **124** are inserted into the outer sleeves **108**. The buttons **132** are held in by the inner wall of the sleeve **108**. When the legs **122** and **124** are pushed down far enough so that the buttons **132** are at the level of the through hole of the outer sleeve, the buttons **132** pop out under the influence of the biasing spring **130** to latch the legs **122** and **124** in place. In order to remove the retainer bar **120**, the buttons **132** are depressed and the retainer bar **126** is removed.

FIG. **36** illustrates an embodiment of a latch **350** that can be used in all embodiments in which the outer sleeve is within the mattress platform and is therefore not accessible, for example, as illustrated in FIGS. **24** and **26**. The latch **350** can also be used in embodiments in which the outer sleeve is disposed, for example, in a groove, on the top of the mattress platform **54** (FIG. **1**).

The latch **350** is a dual button latch type snap button. Such latches are available from Valco Valley Tool & Die, Inc. Other latch mechanisms are also suitable. As will be described in more detail below, one button is used for latching and the other button is used to release the latch.

As shown, an outer sleeve **352** is shown below the surface of the mattress platform **54** (FIG. **1**). A leg **356** is of the retainer bar is shown within the sleeve **352**. The leg **356** includes a through hole for receiving a first button **358**. As shown, when the leg **356** is fully inserted within the outer sleeve **352**, the first button is below the surface **354** of the mattress platform **54** and is received in a through hole **360** in the outer sleeve **352** to latch the leg **356** in place. A second button **362** axially spaced above the first button **358** above the surface of the mattress platform **54** is received in a through hole in the leg **356** to receive the button **362**.

The first button **360** is used for latching and the second button **362** releases the latch. In operation, the second button **362** is depressed which under the influence of the spring force causes the first button **358** to be retracted. The leg **356** is then inserted into the outer sleeve **352**. When the first button **358** comes in contact with the outer sleeve, **352**, the second button **362** is released. Once the first button **358** is at the level of the through hole **360** in the outer sleeve **352**, the first button **358** pops out and is received in the through hole **358** in the outer sleeve **352** to latch the leg **356** in place.

In order to remove the retainer bar, the second button **362**, which will be above the surface of the mattress platform, is depressed. This causes the first button **358** to be retracted under the influence of the spring force to enable the retainer bar to be removed. The retainer bar can then be removed.

FIGS. **37-39** illustrate exemplary embodiments of a motorized version of retainer bar. The embodiment illustrated in FIGS. **37** and **38** is illustrated in connection with horizontal movement of a head and foot retainer bar, as illustrated in FIGS. **26** and **27**. It is also contemplated that the motorized version can be configured for use with horizontal movement of corner retainer bars. As shown in FIG. **39**, the motorized version can also be used for vertical movement for both head/foot and corner retainer bars, as illustrated by the corner retainer bar **406**.

In the embodiment illustrated in FIGS. **37** and **38**, the retainer bar **380** is attached or integrally formed with a carriage **382**. Other carriers for the retainer bar are also contemplated. The carriage **32** is slidingly received in a pair of spaced apart rails or brackets. **384**. These brackets **384** may be secured to an underside of the mattress platform **54** (FIG. **1**) to enable the retainer bars to be placed in a retracted position, as shown, for example, in FIG. **26** and an extended position, as shown in FIG. **27**.

This embodiment also includes a motor **336** and a mechanical mechanism **388** for translating the rotary motion of a motor shaft to horizontal motion for automatically extending and retracting the retainer bars. Various mechanical mechanisms **388** are contemplated. A rack and pinion mechanical mechanism is illustrated. However, virtually any mechanical mechanisms for translating the rotary motion of a motor shaft to linear motion can be used, such as a rotary screw drive or worm drive.

The motor **336** may be a stepper motor. As is known in the art, such stepper motors in combination with a encoding disk enable the stepper motor to be programmed for a predetermined amount of the retainer. Specifically, with reference to FIGS. **26** and **27**, the stepper motor can be programmed to extend the retainer bar as illustrated in FIG. **27** and retract the retainer bar, as shown in FIG. **26**. Such programming of a stepper motor is well within the ordinary skill in the art. Motors other than stepper motors are also contemplated.

The stepper motor is typically connected to a control box **390** that is connected to an external source of electrical power **392**. The control box **390** may be configured to allow the stepper motor to be controlled by way of a wireless remote control. Such control boxes are well within the ordinary skill in the art.

In operation, when it is desired to rotate a mattress, the stepper motor **386** is controlled to extend the retainer bar, as illustrated in FIG. **27**. The mattress is then rotated, as illustrated, for example in FIG. **19**. Once the mattress is in the desired position, the stepper motor **386** is controlled to retract the retainer bar, for example, as illustrated in FIG. **26**.

An alternate embodiment of the motorized retainer bar is illustrated in FIG. **39**. This embodiment is similar to the embodiment illustrated in FIGS. **37** and **38**. In this embodiment the carriage is eliminated and the mechanical mechanism **400** is formed on or attached to the free ends of the legs of the retainer bar **402**. In this embodiment, a rack and pinion mechanical mechanism is shown. However, other types of mechanical mechanisms are contemplated, as discussed above. The legs of the retainer bar **402** may be secured to the underside of the mattress platform **54** by way of one or more brackets **404**. As shown, the motorized version can be used with head and foot retainer bars **402** as well as corner retainer bars **406**.

An alternate configuration of a retainer bar is illustrated in FIG. **40**. In this embodiment, the retainer bar **410**. The retainer bar **410** is configured for use with fitted sheets. The retainer bar is formed with a generally "L" shaped configuration defining a vertical leg **412** and a horizontal leg **414**. As shown, the vertical leg **412** is formed with an indentation **416**. The indentation **416** is configured to be disposed adjacent the bottom of the mattress **418**. As such, the free edge of the fitted sheet is received in the indentation. As shown, the horizontal leg **414** can be secured to an underside of the mattress platform **420**.

FIGS. **41A-41C** illustrate yet another alternate embodiment of a retainer bar system. In this embodiment, a generally "L" shaped retainer bar. The retainer bar **430** includes a horizontal leg **432** and a vertical leg **434**. The vertical leg **434** is secured to a vertical wall of a mattress platform or foundation **436**. The horizontal leg **432** is disposed to be parallel to the top of the mattress platform **436**. The horizontal leg **432** is slightly spaced above the mattress platform **436**, for example by ⅛-½ inch and otherwise configured to catch a pocket **438** formed in an underside of a mattress encasement **440**.

Obviously, many modifications and variations of the invention are possible in light of the above teachings. All such configurations are intended to be within the broad scope of the invention. Thus, it is to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described above.

I claim:

1. A mattress retainer assembly for selectively constraining rotational movement of a mattress, said mattress retainer assembly comprising:

a bracket formed to be securely attached to a bed frame, said bracket further formed to receive a mattress retainer bar and allow for movement of said mattress retainer bar in a linear direction;

the mattress retainer bar, movably mounted relative to said bracket in a linear direction with respect to said bracket, said mattress retainer bar movable between an extended position in which movement of a mattress relative to said bracket is constrained by said mattress retainer bar and a retracted position in which movement of the mattress is not constrained by said mattress retainer bar; and

a detent mechanism for latching said mattress retainer bar in said extended position.

2. The mattress retainer assembly as recited in claim **1**, wherein said mattress retainer bar is movably mounted in a direction generally perpendicular to a sleeping surface of said mattress.

3. The mattress retainer assembly as recited in claim **1**, wherein said bracket is formed to be securely attached to a bed frame that is formed as an adjustable platform.

4. The mattress retainer assembly as recited in claim **1**, wherein said bracket and said mattress retainer bar are formed to be disposed adjacent a flat side panel of said mattress.

5. The mattress retainer assembly as recited in claim **1**, wherein said bracket and said mattress retainer bar are formed in an "L" shape so as to be able to be disposed adjacent a corner of a mattress.

6. The mattress retainer assembly as recited in claim **1**, wherein said mattress retainer bar is "C" shaped.

7. The mattress retainer assembly as recited in claim **1**, wherein said mattress retainer bar is not "C" shaped.

8. The mattress retainer assembly as recited in claim **1**, wherein said mattress retainer bar includes a first pair of spaced apart parallel legs connected together with a bar and further includes a pair of spaced apart supports connected on end to said first pair of spaced apart legs and further includes a pair of spaced apart parallel inserts connected on end to said spaced apart supports.

9. The mattress retainer assembly as recited in claim **8**, wherein said mattress retainer bar is formed to be attached to a flat surface of said mattress.

10. The mattress retainer assembly as recited in claim **8**, wherein said mattress retainer bar is formed to be attached across a corner of a side panel of said mattress.

11. A mattress retainer system for preventing unintended rotation of a mattress with respect to an adjustable platform; the mattress retainer system comprising:

a mattress retainer bar having a pair of spaced apart "L" shaped legs connected together on one end by a bar, said "L" shaped legs each having a vertical leg and a horizontal leg, wherein said vertical legs are formed to be secured to a vertical surface of said platform and horizontal legs and said bar are formed to lie generally parallel to a flat surface of said adjustable platform; and

an encasement for encasing said mattress, said encasement formed with a complementary member for engaging the mattress retainer bar to prevent rotation of the mattress with respect to said platform.

12. The mattress retainer system as recited in claim **11** wherein said complementary member includes a second mattress retainer bar attached to an underside of the encasement for engaging said mattress retainer secured to said foundation when said mattress is aligned with said platform.

13. The mattress retainer system as recited in claim **11** wherein said complementary member includes a pocket attached to an underside of the encasement for engaging said mattress retainer secured to said foundation when said mattress is aligned with said platform.

14. A mattress retainer assembly for selectively constraining rotational movement of a mattress, the mattress retainer assembly comprising:

a carriage formed to be securely attached to a bed frame for carrying a mattress retainer bar;

a mattress retainer bar for selectively constraining a mattress from rotating, said mattress retainer bar selectively movably mounted with respect to said bracket between a retracted position and an extended position;

a mechanical mechanism attached to said mattress retainer bar for translating rotational movement of a motor shaft to linear motion, said mechanical mechanism formed to move said mattress retainer bar between said retracted position and said extended position;

a motor attached to said mechanical mechanism; and

a control box for selectively powering said motor.

15. The mattress retainer assembly as recited in claim **14**, wherein said mechanical mechanism is a rack and pinion.

16. The mattress retainer assembly as recited in claim **14**, wherein said motor is a stepper motor.

17. A retainer bar for a fitted sheet used on a platform, the retainer bar comprising:

an "L" shaped retainer bar having a horizontal leg and a vertical leg, said retainer bar formed to be attached to an underside of said platform; and

an indention formed in said vertical leg for receiving a free end of the fitted sheet.

18. A mattress retainer assembly for selectively constraining rotational movement of a mattress, the mattress retainer assembly comprising:

a bracket formed to be securely attached to a bed frame, said bracket formed to receive a mattress retainer bar;

the mattress retainer bar, movably mounted relative to said bracket for selective rotational movement with respect to said bracket about an axis generally parallel to a sleep surface of the mattress, said mattress retainer bar movable between a retracted position in which movement of a mattress relative to said bracket is constrained by said mattress retainer bar and an extended position in which movement of the mattress is not constrained by said mattress retainer bar; and

a detent mechanism for latching said mattress retainer bar in said extended position.

19. The mattress retainer assembly as recited in claim **18**, wherein said axis is generally parallel to a transverse axis of said mattress.

20. A mattress retainer assembly for selectively constraining rotational movement of a mattress, the mattress retainer assembly comprising:

the mattress retainer bar, formed to be rotationally mounted relative to a bed frame about an axis generally parallel to a longitudinal axis of the mattress, said mattress retainer bar movable between a retracted position in which movement of a mattress relative to said bracket is constrained by said mattress retainer bar and an extended position in which movement of the mattress is not constrained by said mattress retainer bar; and

a bracket formed to be securely attached to said bed frame for restraining rotation of said mattress retainer bar in said retracted position.

* * * * *